

VOLUME XXX

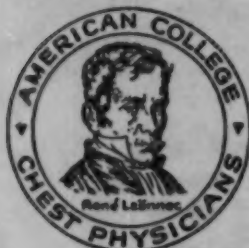
NUMBER 6

DISEASES

of the

CHEST

OFFICIAL PUBLICATION



PUBLISHED MONTHLY

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DECEMBER
1956

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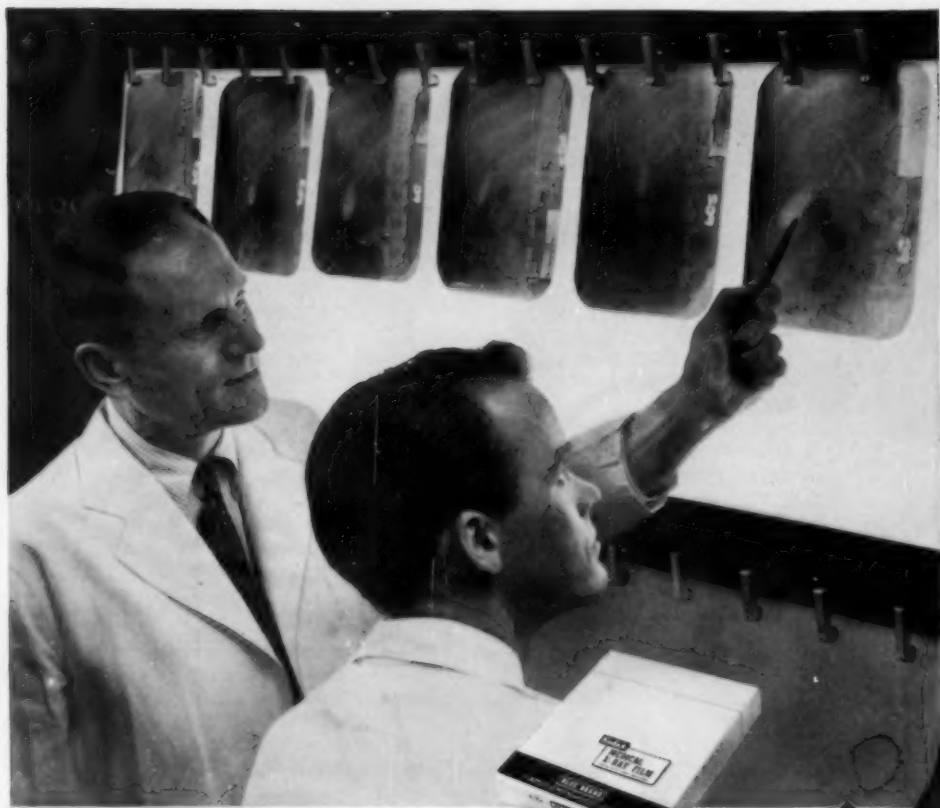
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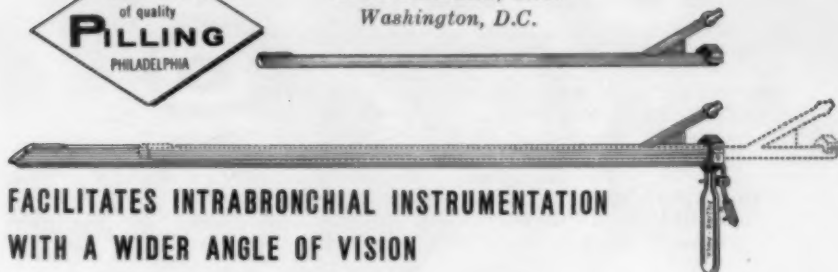
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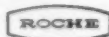
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*Cherniah, S. M., and Peck, F. B., Jr.: *Antibiotic Med.*, 1:377, 1955.

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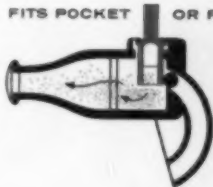
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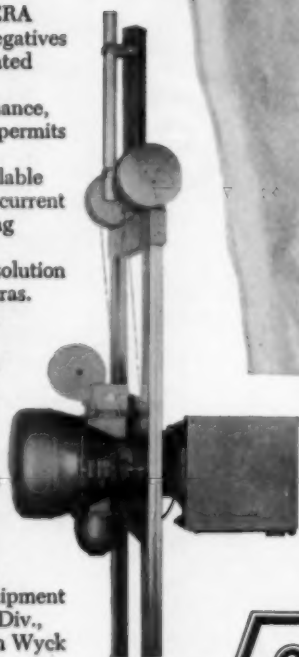
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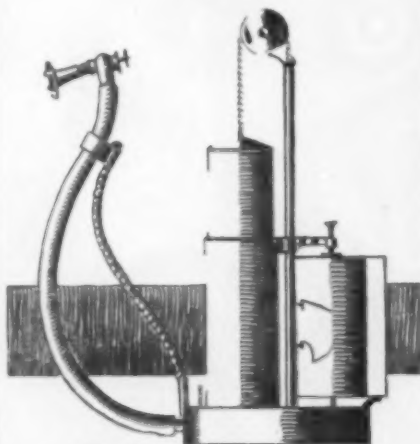
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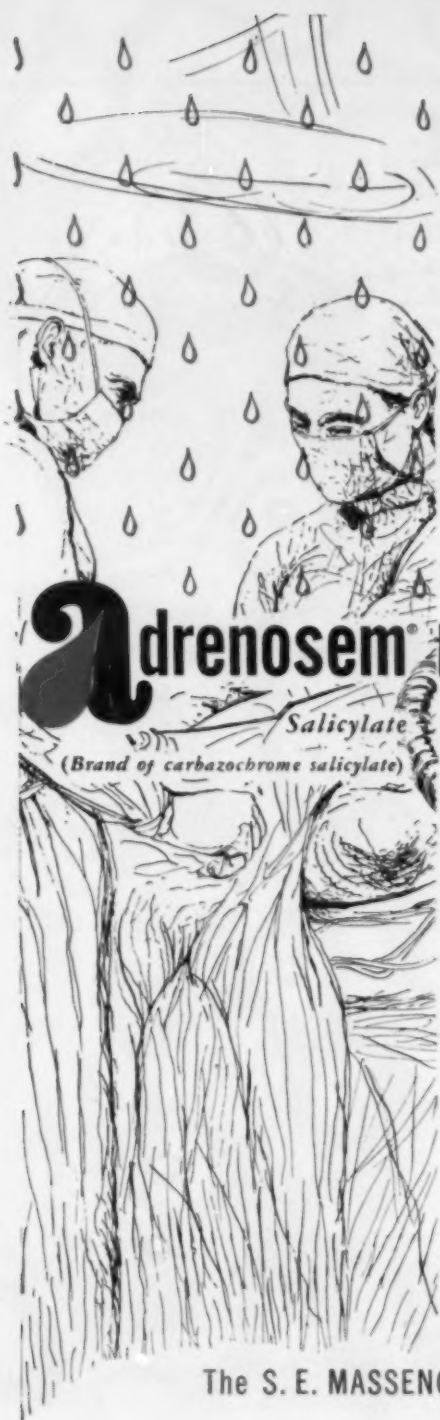
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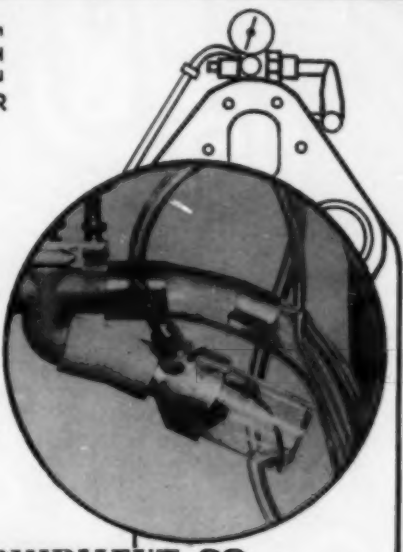
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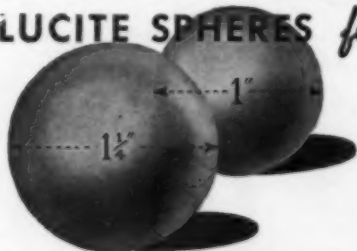


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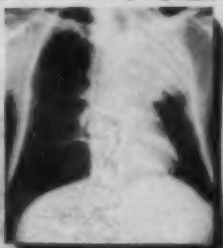
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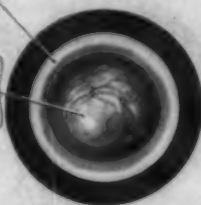
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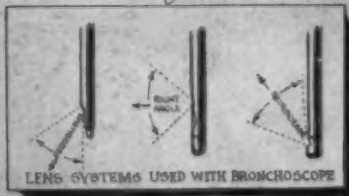
Bronchus to upper left lobe

Tumor
in
bronchus



VIEW OBTAINED WITH RIGHT ANGLE TELESCOPE

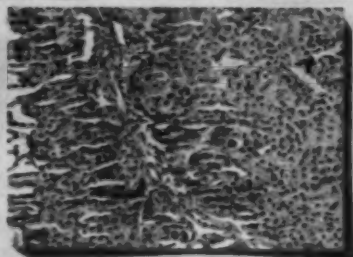
Right bronchus



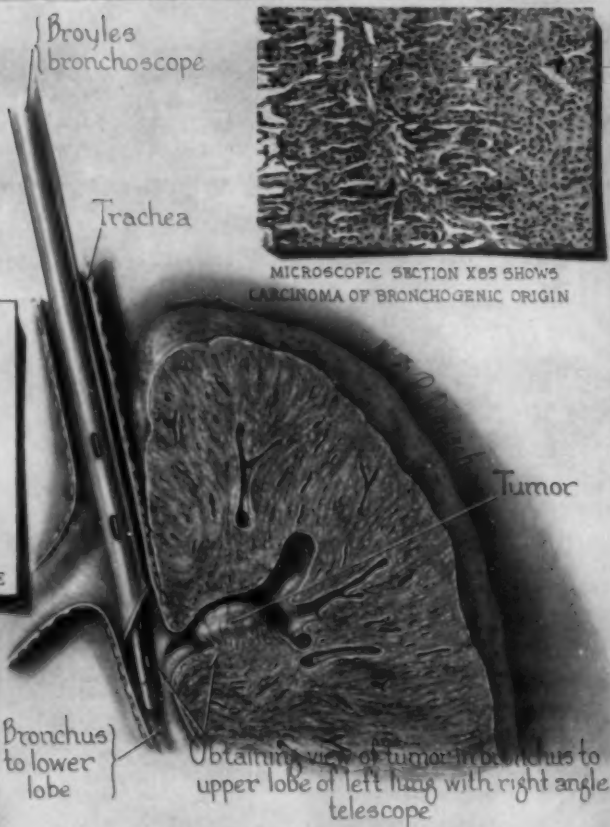
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Tumor

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to lower
lobe

Obtaining view of tumor in bronchus to
upper lobe of left lung with right angle
telescope

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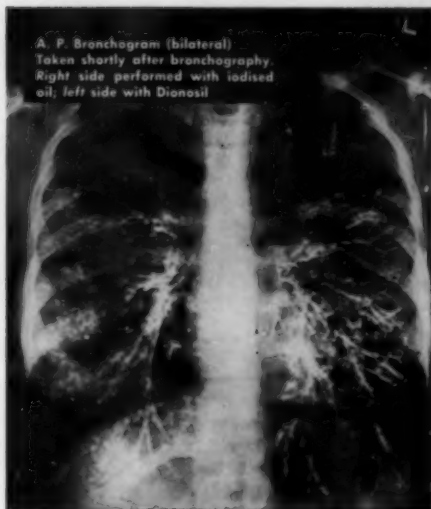
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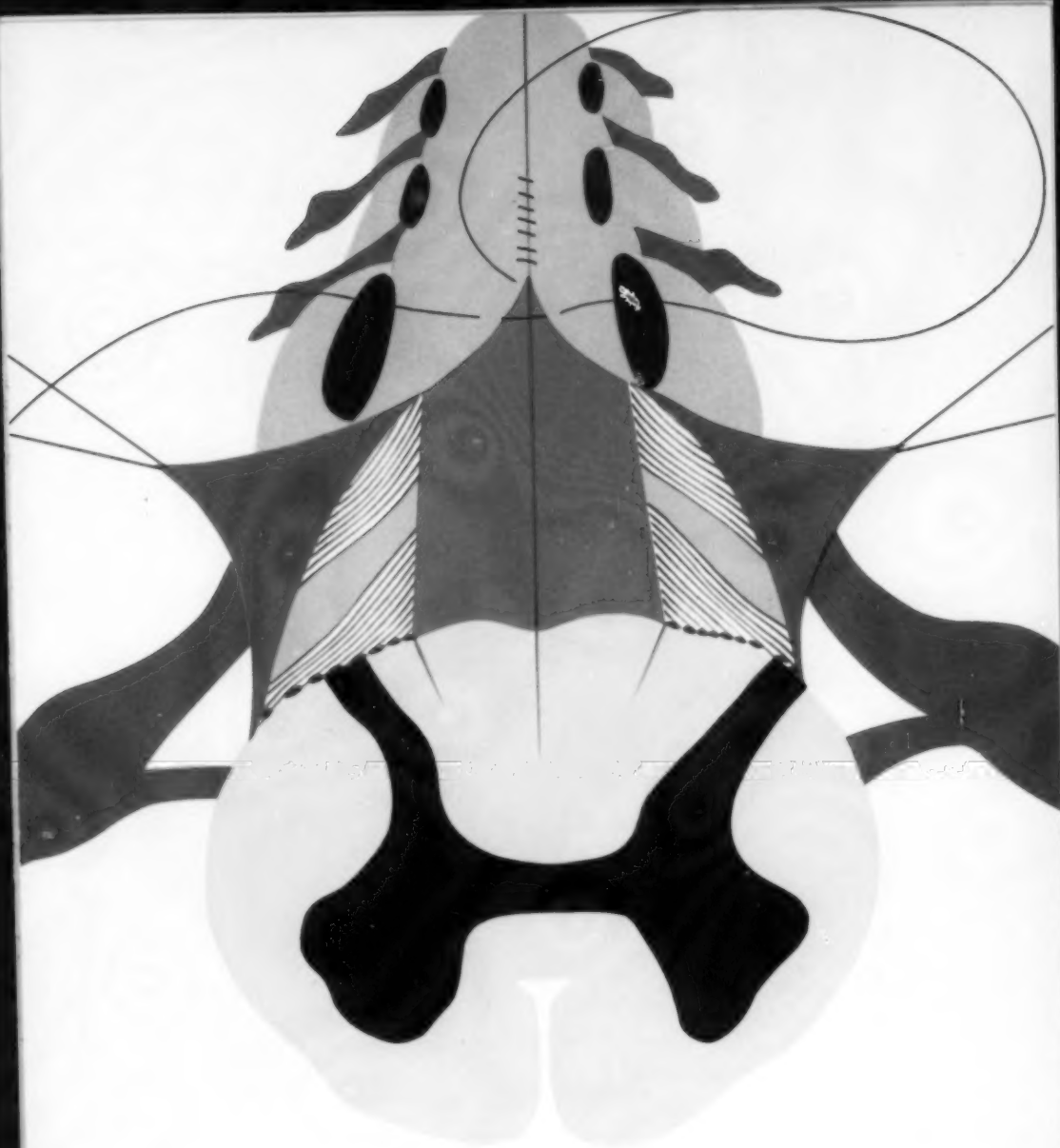
Cohen, R. V.; Molthan, L.,
and Zarafonitis, C. J. D.:
Clinical Studies of
Various Forms of PAS
(with special reference
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Diseases of the Chest
30:418-428 (Oct.) 1956.

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¹Dr. Samuel Phillips: *Calcium Benzoyl PAS*, Paper presented at 15th VA-Army-Navy Conference on Chemotherapy of Tuberculosis, St. Louis, Missouri, February 6-9, 1956.

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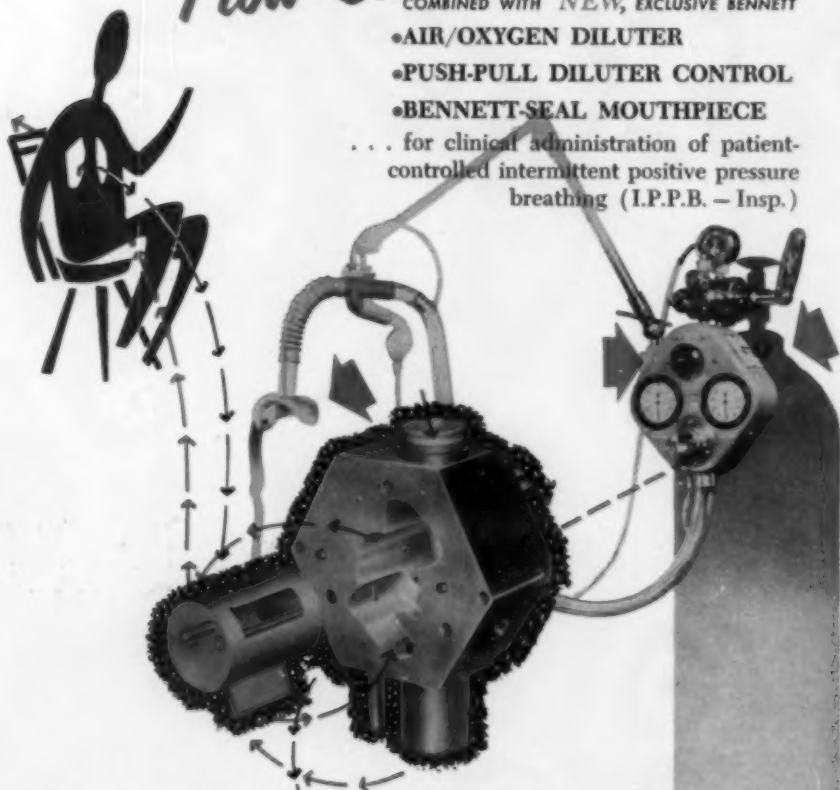
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DISEASES of the CHEST

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Symposium on Rehabilitation in Cardiovascular Disease Introduction

R. W. KISSANE, M.D., F.C.C.P.

Columbus, Ohio

The development of the methods and the basic principles of rehabilitation as they pertain to persons with cardiovascular disease has lagged far behind the progress made in those with war injuries, accidents, orthopedic problems and tubercular infection. The physician uses his art in an attempt to rehabilitate the specific patient, but unless there is an unusual or striking necessity, a large majority of the patients do not benefit by this type of counsel and direction. When one becomes interested in the over-all problem of rehabilitation, at first there develops a feeling of frustration, because of the many facets, some of which appear to be opposed to each other.

The object of this symposium is to present various lay and professional opinions. It has brought out agreement amongst the authors on certain basic ideas. It has also called attention to the controversial opinions that need further exploration and discussion.

Recovery and Rehabilitation Following Coronary Occlusion

ARTHUR M. MASTER, M.D., F.C.C.P.,* H. L. JAFFE, M.D.*

New York, New York

and R. W. KISSANE, M.D., F.C.C.P.**

Columbus, Ohio

As time has passed, the serious outlook for surviving an acute attack of coronary occlusion, or for recovering sufficiently to lead a useful life subsequently, is giving way to increasing optimism and to a movement toward encouraging the patient to return to work. This view has been expressed by Master and Jaffe in a series of papers over the past two decades,¹⁻⁴ and other authors have published similar reports.⁵⁻¹¹ The im-

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provement in prognosis is the result of (1) more accurate diagnosis, resulting in the detection of many mild attacks which had previously been overlooked, and (2) advances in therapy, e.g., the use of vasoconstrictor and anticoagulant drugs when indicated.

Master, Jaffe and their associates followed 500 patients who had survived acute coronary occlusion by at least one year.⁴ The series comprised 90 per cent private and 10 per cent ward patients; there were five males to one female, and the average age at the time of the initial acute occlusion was 53.3 years. The diagnosis was confirmed electrocardiographically by the presence of Q-waves and RS-T elevation, indicating through-and-through infarction. Cases of acute coronary insufficiency with subendocardial necrosis (infarction), showing only RS-T depression and/or T-wave inversion, were not included;^{4, 12} as a rule these patients run a milder course than those with coronary occlusion and their prognosis is usually excellent.

Following the acute attack, 41.8 per cent of the 500 cases of coronary occlusion made a complete functional recovery, i.e., they were asymptomatic. A similar percentage, 42.6, experienced mild anginal pain or dyspnea on exertion, but their activity was only slightly restricted, if at all. Combining these two groups, it is evident that over four out of five patients made either a satisfactory or excellent recovery. The remaining patients included 10 per cent who experienced moderate angina or dyspnea and 5.6 per cent in whom these symptoms were intractable.

It is interesting that, in the group of 209 patients who were *asymptomatic*, having made complete recovery, 177 (84.7 per cent) presented objective evidence of the previous coronary occlusion in the electrocardiogram and/or x-ray. Over two-thirds showed mild to moderate cardiac enlargement and electrocardiographic alterations and 32 patients showed marked changes, with a definite diagnosis of ventricular aneurysm in 12. In these 209 asymptomatic patients, the subsequent mortality rate was only 15.3 per cent. Two-thirds had already survived over five years and 22.6 per cent over 10 years. Two-thirds of the patients were working full time and 20 per cent part time.

In the group of 213 patients who had made satisfactory recovery, i.e., they experienced mild angina or dyspnea, the length of survival, mortality rate and percentage returning to work were only slightly less satisfactory than in the previous asymptomatic group. Considering the entire series of 500, the average period of survival was 7.2 years. Three-fourths of them were still alive, 51.7 per cent having survived over five years and 17.3 per cent over 10 years. Eleven were alive over 15 years and 70 per cent were working. Cardiovascular disease was the cause of death in 88.6 per cent of those who died.

Kissane followed 153 males and 47 females after a coronary occlusion until death. After three to six months they were advised to return to their old employment unless it was hazardous or very strenuous. At first they worked part time. Forty-one per cent returned to full employment and maintained it an average of seven years. Twenty-five per cent did

limited work and 20 per cent were unable to work. Among the males the average life span following the attack was nine years.

As might be expected, Kissane observed that the self-employed patients found it easier to resume work since they were able to control their work and rest periods. Skilled laborers often were given inspecting or supervising duties. The unskilled laborers were frequently unemployed but often managed to find various less strenuous jobs. Some patients experienced angina at first but later were able to do the work without difficulty. Many of the patients complained of weakness but this was usually of extracardiac origin and usually amenable to reassurance and other therapy.

The 47 women survived an average of 11 years. All were able to perform light housework soon after becoming ambulatory. Later they carried on as before the attack except for restricting heavy work and outside activities. Those that were employed as teachers or in offices resumed their work but reduced their housework.

Another group of 20 men were collected who stopped working only for two or three days during the acute attack and then resumed working although they did not feel well. All are living after four or five years and are working, but almost half of them have a progressive anginal syndrome. Only five of the 20 are completely rehabilitated.

Another group of 23 was collected who had survived at least 15 years (average, 17) and were completely rehabilitated. Six had developed a second occlusion within six years. All the men in this group had led lives requiring a minimum of physical exertion prior to the attack and continued doing so subsequently.

DISCUSSION

From the foregoing observations it is evident that at least four out of five patients make a satisfactory or complete functional recovery from acute coronary occlusion and are able to perform useful work for many years. Unfortunately, most people still look upon heart disease, particularly angina pectoris and coronary occlusion, with dismay and are filled with apprehension that they will become permanent invalids. As a result, they often develop a severe psychoneurotic state, with chest pain, which may incapacitate them even when cardiac efficiency has been restored. One of the major functions of the physician is to reassure the patient, as well as his family, during the attack and later to advise early resumption of gainful work when possible. The patients in our series who resumed working ran a course which did not differ from those who had retired; other writers have reported similar findings.^{13, 14} The work performance of such patients is usually very satisfactory.

Each one must be treated individually, as to when he should return to work and what type of work to undertake. Many patients can resume their usual positions or jobs, others must seek less strenuous work. The best guide to the degree of recovery following coronary occlusion and ability to work is how the patient feels, not the degree of change in the electro-

cardiogram or x-ray film. In other words, the patient may feel well despite marked alterations in the electrocardiogram. Even the individual with anginal pain may work if it is found that the pain is not aggravated by working. Not infrequently, indeed, the patient experiences less discomfort if he works. While the electrocardiogram is not reliable prognostically, when it does return to normal and the heart size and pulsations are normal, generally there is no anginal pain or dyspnea.

The patient and the physician have a right to be optimistic about the prognosis in coronary occlusion, both during the attack and afterwards. The majority survive for many years and lead productive lives. The outlook for those who return to work is at least as good as it is for those who retire. Periodic examinations should be made, to determine whether any change in the type of work done is necessary. As a general policy, they should not be placed in positions in which the occurrence of attacks of anginal pain will endanger the lives of others.

The physician can perform a great service in directing the patient back to a productive life. In addition, the cooperation of the local medical societies, industry and social and government agencies is required. A good start has already been made to give cardiac patients the opportunity for suitable work; work classification units, workshops for cardiac patients, vocational guidance and rehabilitation centers and selective placement studies have been developed. Employers are being urged to engage people with heart disease. Some states, through second injury laws, have attempted to stimulate employment of cardiacs by means of an equitable adjustment of the liability which an employer must assume in hiring a disabled worker.

RESUMEN

Los datos presentados en este trabajo recalcan que la gran mayoría de los enfermos se recupera bien de la oclusión coronaria aguda y sobreviven al ataque muchos años. Durante este período la mayoría trabajan a tiempo completo o parcial sin detrimento de su salud.

Debe ser animado para hacerlo si bien la decisión debe ajustarse a condiciones individuales. Después de un ataque moderado de trombosis coronaria el enfermo frecuentemente queda capacitado para trabajar después de dos a tres meses. En los casos más severos el tiempo puede ser de seis meses. Los enfermos con enfermedad coronaria son frecuentemente excelentes trabajadores. El llevar una vida productiva es lo mejor que puede hacerse para evitar una neurosis cardíaca.

RESUME

Les constatations rassemblées dans cette communication mettent l'accent sur le fait que la grande majorité des malades guérissent parfaitement de l'occlusion coronarienne aiguë et survivent plusieurs années après l'attaque. Durant cette période la plupart d'entre eux travaillent à temps plein ou à temps partiel sans inconvénient pour leur santé. On devrait les encourager à agir ainsi, bien que la décision doive être prise dans chaque cas selon ses caractères particuliers.

Après une légère atteinte de thrombose coronarienne, le malade est fréquemment capable de retravailler au bout de deux ou trois mois. Dans des cas plus sévères, l'intervalle peut être des six mois. Les malades atteints d'affection coronarienne sont fréquemment d'excellents ouvriers. Mener une vie productive est le meilleur moyen d'éviter une névrose cardiaque.

ZUSAMMENFASSUNG

Die in dieser Arbeit vorgelegten Angaben heben die Tatsache hervor, dass sich bei weitem die Mehrzahl von Kranken gut erholt nach akutem Coronarverschluss und den Anfall viele Jahre lang überlebt. Während dieses Zeitraumes arbeiten die meisten von ihnen voll oder teilweise ohne Nach für ihre Gesundheit. Sie sollten in diesem Verhalten bestärkt werden, obgleich die Entscheidung hierüber für jeden Fall gesondert behandelt werden muss. Im Anschluss an einen leichten Anfall von Coronar-gefäßstrombose ist der Kranke häufig fähig, nach 2-3 Monaten wieder zu arbeiten. Bei schweren Fällen kann der Zeitraum 6 Monate betragen. Patienten mit Coronarerkrankung sind häufig vortreffliche Arbeitskräfte. Ein produktives Leben zu führen bedeutet das beste Mittel, um Herzneurosen zu verhindern.

REFERENCES

- 1 Master, A. M., Jaffe, H. L. and Dack, S.: "A Study of 150 Cases of Coronary Thrombosis Treated with Low Calorie Diet," *Am. Heart J.*, 10:1102, 1935.
- 2 Master, A. M. and Dack, S.: "Rehabilitation Following Acute Coronary Occlusion," *J.A.M.A.*, 115:828, 1940.
- 3 Master, A. M. and Jaffe, H. L.: "Complete Functional Recovery After Coronary Occlusion and Insufficiency," *J.A.M.A.*, 147:1721, 1951.
- 4 Master, A. M., Jaffe, H. L., Teich, E. M. and Brinberg, L.: "Survival and Rehabilitation after Coronary Occlusion," *J.A.M.A.*, 156:1552, 1954.
- 5 Bland, E. F. and White, P. D.: "Coronary Thrombosis (With Myocardial Infarction), 10 Years Later," *J.A.M.A.*, 117:1171, 1941.
- 6 Levine, S. A. and Rosenblum, F. F.: "Prognostic Value of Various Clinical and Electrocardiographic Features of Acute Myocardial Infarction. II. Ultimate Prognosis," *Arch. Int. Med.*, 68:1215, 1941.
- 7 Crain, R. B., Missal, M. F. and Wilson, K. W.: "The Industrial Employee with Myocardial Infarction, His Ability to Return to Work," *A.M.A. Arch. Indust. Hyg.*, 1:525, 1950.
- 8 Sigler, L. H.: "Prognosis of Angina Pectoris and Coronary Occlusion," *J.A.M.A.*, 146:988, 1951.
- 9 Goldwater, L. J., Bronstein, L. H. and Kresky, B.: "A Comparison of Working and Non-Working Cardiacs," *A.M.A. Arch. Indust. Hyg.*, 5:485, 1952.
- 10 Smith, C.: "Length of Survival after Myocardial Infarction," *J.A.M.A.*, 151:167, 1953.
- 11 Cole, D. R., Singian, E. B. and Katz, L. N.: "Long-Term Prognosis Following Myocardial Infarction," *Circulation*, 9:321, 1954.
- 12 Master, A. M., Jaffe, H. L., Dack, S. and Grishman, A.: "Coronary Occlusion, Coronary Insufficiency and Angina Pectoris," *Am. Heart J.*, 27:803, 1944.
- 13 Benton, J. G. and Rusk, H. A.: "Rehabilitation of the Patient with Cardiovascular Disease," *Bull. New England M. Center.*, 14:105, 1952.
- 14 Jezer, A.: "Work Capacity of the Cardiac," *M. Clin. North America*, 37:667, 1953.

The Public Health Aspects of Rehabilitation in Cardiovascular Disease

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Because physicians are chiefly concerned with the immediate problems of diagnosis, treatment and rehabilitation of individual patients, the important public health and community aspects of heart disease may not be appreciated.

Heart disease presents important problems in the field of public health because:

1. It is a major cause of disability and premature death among our population. More than nine million persons in the United States are estimated to have cardiovascular renal disease in a significant form. Surely many of this group are disabled by their disease. Mortality, figures for 1955 show that diseases of the heart and blood vessels caused over half (52.7 per cent) of all deaths in the United States and that over 90 per cent of the deaths from cardiovascular disease were caused by arteriosclerosis and high blood pressure. This proportionate mortality has been graphically presented.¹ For all persons under 65 years of age, cardiovascular disease accounted for over one-third (35.4 per cent) of all deaths in 1952.²

2. Cardiovascular disease is increasing in its deleterious effects on our population. The death rates have almost doubled since 1900. While part of this increase can be attributed to our aging population, this does not detract from the importance of the fact. It is logical to assume that the increased death rates are accompanied by an increased amount of disability from heart disease in the population.

3. Knowledge is available which can significantly reduce disability and premature death from some cardiovascular diseases.

4. Because of this complex nature, problems are encountered by patients and their physicians which cannot be adequately met without the use of community resources.

Function of the Rehabilitation Agency

The function of the rehabilitation agency, either State or local, is to support the physician with rehabilitation services and skills so that the patient may be returned to gainful employment. Eligibility for rehabilitation in State programs is based upon: (1) The presence of a physical or mental disability with resulting functional limitations or limitations in activities; (2) the existence of a substantial handicap to employment caused by the limitations resulting from such disability; and (3) a reasonable expectation that vocational rehabilitation services may render the individual fit to engage in a remunerative occupation.³ State rehabilitation services are made available to the patient by formulating, in cooperation

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with the physician, an individual plan for vocational rehabilitation of the particular patient. The basis for this plan is a comprehensive evaluation of pertinent medical, social, psychological and vocational factors in the case. The whole patient and his total environment must be considered, not just a single disability he may have. After rehabilitation it is the patient's total abilities that are important, not just the extent of recovery from his presenting disability.

As a part of this evaluation, a diagnostic study is made in order to determine the basis for: (1) establishing that a physical or mental condition is present which limits the activities the individual can perform; (2) appraising the current general health status of the individual in order to determine his limitations and capacities; (3) determining how and to what extent the disabling conditions may be expected to be removed, corrected, or minimized by physical restoration services; and (4) selecting an employment objective commensurate with the individual's capacities and limitations and a determination of the services required to prepare the patient for his selected work.³ The medical portion of the diagnostic study is divided into three parts so as to include:

1. A complete general medical examination to provide an appraisal of the current medical status of the individual.
2. Examinations by specialists in all medical specialty fields as needed.
3. Clinical laboratory tests, x-ray films and other indicated studies.

The diagnostic phase can include special studies that may be needed, such as "an evaluation of the individual's personality, intelligence level, educational achievements, work experience, vocational aptitudes and interests, personal and social adjustments, employment opportunities, and other pertinent data helpful in determining the nature and scope of needed services to be provided for accomplishing the individual's vocational rehabilitation objective."³

When the evaluation is completed, the physician, the patient, representatives of the rehabilitation and health services are able to jointly develop the total plan for the particular patient and his problems. This plan spells out:

1. The rehabilitation objective or tentative goal where the ultimate objective cannot be immediately determined.
2. The services necessary to accomplish the patient's vocational rehabilitation.
3. The means for providing or securing the necessary services.

Depending upon the requirements of the individual case, many different skills may be used by the physician for the total treatment of the patient with cardiovascular disease. A partial listing of skills and services would include the following:

1. Medical Specialists

Cardiovascular diseases may be associated with other medical conditions affecting the treatment of the case that require expert medical consultation. For example, a patient with coronary artery disease may have an associated allergic, bronchial asthma, whose effective relief by an allergist

would improve response to treatment for cardiovascular disease. A similar wide range of medical specialists such as orthopedists, industrial physicians, pediatricians, and internists might be needed and used as consultants by private physicians.

2. Social Workers

Social workers make an important contribution to the efforts of the physician by aiding with problems of the patient and his family that aggravate his disease. They are familiar with the available community facilities for financial relief and direct home services that may be needed by the patient and his family, including case work service, special transportation, food purchasing, homemaker services, etc., as well as arranging for other needed assistance to the family through relatives, friends or community agencies.

3. Psychiatrists and Psychologists

Because of the important long-term effects of most cardiovascular diseases, emotional problems may develop that affect treatment and recovery. These can often be evaluated and effectively relieved following psychological study of the patient. "Take it easy" or "let up for a while" is rarely sufficient counsel for a hypertensive person who has worked his way to the top in a competitive world. Similarly, "cheer up" or "you are getting along fine" may not prevent a depressed individual from committing suicide.

The problems of fear, and acceptance of limitations imposed by cardiovascular disease are other examples of where a psychiatrist or clinical psychologist can be effectively used as an aid in accomplishing successful medical therapy.

4. Vocational Counselors

If a change of occupation or work seems advisable, study of the patient's actual and potential ability by a vocational counselor will enable the physician to evaluate the need for a change of occupation. If a change is considered necessary or desirable, the studies of the vocational counselor are an important aid in the selection of an occupation that is appropriate for the interests and abilities of the patient as well as coming within his physical capacity.

5. Employment and Personnel Counselors

These skills are needed by the person who has been forced to change his occupation and, following maximum physical recovery and reeducation, is ready to re-enter the labor market. Much ingenuity and education is required to convince employers that the individual with cardiovascular disease can work and is a valuable employee. Fear of aggravation of the disease by work and provisions of "the second injury law" make many employers reluctant to hire rehabilitated cardiac patients, because they may not be protected by their industrial insurance or the provisions of the Employee's Compensation Act when one with known cardiovascular disease is hired and later suffers recurrence.

6. *Consultant Industrial Physicians*

Consultant industrial physicians have made important contributions by helping convince both management and labor of the value of rehabilitated patients as employees and fellow workers. Proper placement and on-the-job follow-up by industrial physicians can help the patient maintain the benefits of rehabilitation.

Function of the Health Department

In the local situation, the health department usually functions as a contributing member of the rehabilitation team that works under the leadership of the private physician. In addition, the health department carries out its broader responsibility by conducting cooperative community programs for the prevention and control of disease. Many programs are in development stages and the guidance, cooperation and assistance of organized medicine is always required. It should be emphasized that preventive measures are considered applicable to some cardiovascular disease conditions, many of which have important public health aspects, such as:

1. Drug prophylaxis for prevention of rheumatic fever.
2. Drug prophylaxis for certain operative procedures involving infections so as to prevent subacute bacterial endocarditis.
3. Weight reduction among the obese.
4. Identification and diagnosis of preventable secondary hypertension.
5. Prevention of rubella during the first trimester of pregnancy to prevent congenital cardiac abnormalities.
6. Detection, diagnosis and case management of diabetics so as to reduce arterial damage associated with unmanaged diabetes.

It is recognized that atherosclerosis and essential hypertension are the two most important cardiovascular diseases, and that proved preventive measures are not yet available for them. Because of this, the physician's efforts must be directed toward early detection and treatment intended to slow or prevent the progress of these diseases. While this might seem to restrict the applicability of health department facilities, quite the reverse is true, because of the long term nature of these two diseases.

The following are some of the health department services that can be effectively used by the private physician in caring for a large variety of cardiovascular disease cases.

1. Public Health Nursing Service

The public health nurse can be an invaluable aid to the physician in seeing that his prescribed treatment is carried out in the home. The nurse can also be an important aid to the physician with his long term follow up of patients, such as those on prophylactic therapy for the prevention of rheumatic fever recurrences. Also because the nurse sees the patient and his family on repeated occasions, she can save time for the physician by educating the patient and his family on aspects of his disease that the physician desires them to know, but which cannot be fully appreciated at the first explanation.

From her contacts in the home, sometimes other members of the family

are noticed by the nurse who should be seen by their physician. In this way, children with congenital heart disease or adults with hypertensive headaches may be referred to the physician's office for consideration of their symptoms, and diagnosis if disease is found.

2. Home Nursing Service

This community facility may be available through the health department or a voluntary agency where actual bedside nursing in the home is the most practical solution to a particular treatment problem.

3. Nutrition Consultation

A nutritionist can supplement the physician's treatment by working with the patient and teaching him what he needs to know to easily and accurately follow the diet prescribed by the physician. Thus, low sodium or low calorie diets can be more effectively used by physicians when good nutrition consultation is available. Many physicians ask their obese patients to participate in cooperative group weight reduction programs conducted by some health departments.

A few health departments have conducted classes for diabetic patients in response to requests from local physicians and voluntary health groups. These classes are considered to have a beneficial effect from the cardiovascular disease standpoint by reducing the vascular complications associated with uncontrolled diabetes.

4. Laboratory Facilities to Aid in Diagnosis

Where clinical laboratory facilities are not readily available, health departments may be able to assist the physician by arranging for bacteriological studies for patients suspected of having streptococcal infections. This is of particular importance for patients who have a history of rheumatic fever and are not on drug prophylaxis or who have allowed prophylactic treatment to lapse.

5. Social Services

For more effective treatment, many physicians use social services for study and evaluation of the patient's problems in the home and on the job. Where indicated, social workers may assist in obtaining such necessary help as financial relief, and homemaker service, or work with the members of the family to assist them in adjusting to changed home conditions resulting from the illness of one member of the family. A social worker or nurse can be of great help to the private physician by participating in his program for alleviating the emotional problems of both the patient and his family.

6. Special Diagnostic or Treatment Facilities

While the generosity of physicians and hospitals, and the important work of voluntary groups concerned with heart disease have assisted greatly in meeting local needs for special diagnostic or treatment facilities, there are instances in which the health department can be of assistance in arranging for specialized diagnostic or treatment procedures such as

cardiac catheterization, angiocardiography, vectorcardiography, and complicated cardiovascular surgery.

7. Expert Medical Consultation

With the cooperation of specialists and local voluntary groups, health departments can often make available expert medical consultation to practitioners where it would not be otherwise obtainable. Physicians use and appreciate this consultation in such problems as the evaluation of poorly defined heart murmurs, the estimation of activity in a case of rheumatic fever, the definitive diagnosis of congenital cardiovascular lesions, or the estimation of work tolerance in cases of coronary disease.

8. Work Classification Units

A work classification unit is a kind of specialized consultation that can give the private physician an evaluation of a cardiac patient's physical capacity. It uses many different skills in making its study and evaluation of the patient's capacity. Such consultation is of great help to the physician who is contemplating returning his patient to work.

Many of the skills and services mentioned as available from either the Rehabilitation Agency or the health department are not rigidly fixed in either organization. There is much variation among local communities in their availability and source.

It is important to remember that the facilities of the health department can be made available for those patients who may not be able to qualify for the benefits of the state vocational rehabilitation programs.

Voluntary Agencies

Many communities have Heart Associations which have been pioneers in helping the community obtain needed services. Community work classification units for cardiacs have been established in many cities through the stimulation of the local Heart Associations. These organizations have also made important contributions in supporting local and national cardiovascular disease research programs. Many of these research studies deal with the epidemiology and public health aspects of heart disease.

Function of the Private Physician

In the rehabilitation process the role of the private physician is that of a leader of a team of medical and related services necessary for the total treatment of his patient. Because modern treatment must consider the whole individual—his physical, mental and social well-being—the physician, in his role of leader, should use all the needed and available rehabilitation and community facilities to aid him in returning the patient to his maximum capability in the community. It is of great importance that physicians concerned with the prevention, diagnosis and treatment of cardiovascular disease consider what public health and rehabilitation services are needed by, or could be beneficial for, each of their cardiovascular disease patients.

The need for increased use of rehabilitation services by private physicians and medical agencies is urgent, if patients and their communities are to derive the fullest possible benefits of existing and planned rehabilitation programs. As an example, it is estimated that the 2562 cardiac patients rehabilitated under the public vocational rehabilitation program in 1955 increased their annual earnings by more than \$5,000,000.

The cooperation and assistance of physicians is needed by professional organizations, health departments, heart associations, and other community groups in working toward the improvement of facilities in the community for the care and treatment of cardiovascular disease patients.

In addition, physician participation in cooperative programs of public health research is greatly needed so that new discoveries for better prevention, detection, diagnosis and treatment of cardiovascular diseases may be rapidly and accurately developed and instituted.

Where particular skills or services are needed but not available, physicians and physician groups should explore means of obtaining them. The leadership, stimulation and counsel of organized medicine and individual physicians can be of tremendous importance in acquiring needed services for the community.

SUMMARY

Modern medicine requires the treatment of the total patient by the physician so that he may be returned to the greatest usefulness in his community. The goal of public health and rehabilitation programs in cardiovascular disease is to provide the community skills and services needed by physicians and patients so that treatment of the total patient can be accomplished. The private physician is the leader of the team of community skills and services that are available to him. Increased use of this team by the physician will enable him to improve the treatment and rehabilitation of his patients and reduce losses to his community from disability and premature death from cardiovascular disease. The leadership of physicians in the community is also needed to help their communities obtain public health and rehabilitation services that are not available.

RESUMEN

La medicina moderna requiere el tratamiento total del enfermo de manera que pueda ser reintegrado a la comunidad con la mayor posibilidad de ser útil. El objetivo de los planes de salubridad pública y de rehabilitación en enfermedades cardiovasculares es proporcionar al médico y a los enfermos las facilidades que tenga a su disposición la comunidad de modo que el total tratamiento del enfermo pueda realizarse. El médico que hace práctica privada es el guía hacia las posibilidades que ofrezca la comunidad.

El mayor uso de estas facilidades por el médico, le permitirá mejorar el tratamiento y la rehabilitación de los enfermos y reducir las pérdidas de la comunidad por incapacidad y muerte prematura debido a enfermedades cardiovasculares. La guía de los médicos en la comunidad es también

necesaria para ayudar a los grupos sociales para obtener servicios de salubridad y de rehabilitación que aún no estén establecidos.

RESUME

La médecine moderne exige le traitement total du malade, il faut qu'il puisse retrouver l'activité la plus efficace, dans la collectivité à laquelle il appartient. Les programmes d'hygiène sociale et de réadaptation dans les affections cardiovasculaires ont pour objectif l'obtention de moyens d'action mis à sa disposition par la collectivité à la demande des médecins et des malades, pour que le traitement puisse être mené de bout en bout.

Le médecin privé doit diriger l'ensemble de ces moyens d'action mis à sa disposition par la collectivité. Leur utilisation de plus en plus importante par le médecin lui permettra d'améliorer le traitement et la réadaptation de ses malades. Ainsi seront réduits les dommages subis par la collectivité à la suite d'incapacité et de mort prématurée d'origine cardio-vasculaire. L'union des médecins de la collectivité est également indispensable pour leur permettre d'obtenir les moyens qui ne sont pas encore mis à leur service.

ZUSAMMENFASSUNG

Die moderne Medizin verlangt die Behandlung des gesamten Kranken durch den Arzt, sodass er wieder zum grösstmöglichen Nutzen seiner Gemeinschaft gebracht werden kann. Das Ziel der Pläne des öffentlichen Gesundheitsdienstes und der Wiedereingliederung in den Arbeitsprozess bei Herz- und Kreislauferkrankungen besteht darin, die Allgemeinheit mit Fertigkeiten und Arbeitsleistungen zu versorgen, die die Ärzte und Patienten benötigen, sodass die Behandlung des gesamten Patienten durchgeführt werden kann. Der Hausarzt ist der Führer des Teams der Fertigkeiten und Arbeitsleistungen der Allgemeinheit, die ihm zur Verfügung stehen. Ein verstärkter Einsatz dieses Teams durch den Arzt wird ihn instandsetzen, die Behandlung und die Wiedereingliederung seines Patienten in den Arbeitsprozess zu verbessern und wird die Ausfälle durch Arbeitsunfähigkeit und vorzeitigen Tod infolge von Herz- und Kreislauferkrankungen für seine Gemeinschaft herabdrücken. Die führende Rolle der Ärzte in der Allgemeinheit ist ferner notwendig, um ihre Gemeinschaft darin zu unterstützen, Hilfeleistungen für den öffentlichen Gesundheitsdienst und die Rehabilitation zu erwirken, die nicht nur Verfügung stehen.

REFERENCES

- 1 American Heart Association and National Heart Institute: "Diseases of the Heart and Blood Vessels—Facts and Figures," p. 3, *American Heart Association*, New York, Rev. 1954.
- 2 U. S. Public Health Service: "Deaths and Death Rates for 64 Selected Causes, by Age, Race and Sex," *Vital Statistics-Special Reports, National Summaries*, Vol. 40, No. 4, December 21, 1954.
- 3 Federal Register, 19: "7962, C.F.R., Sec. 401.14, 401.15 as amended by 19," *Federal Register*.
- 4 Hellerstein, H. K. and Goldston, E.: "Rehabilitation of Patients with Heart Disease," *Postgrad. Med.*, 15:265, 1954.

The Utilization of Human Resources: A Philosophic Approach to Rehabilitation

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The community often conceives of rehabilitation as a segmentary operation: disability occurs, something is done about it and the problem is supposedly solved. Can we afford, however, to consider rehabilitation apart from all other preventive, developmental, curative, restorative and conservative measures? Many of today's special rehabilitation services were instituted with little thought as to how they were related to the total rehabilitation needs of the community. The planning has seldom embodied deeply-laid conceptions, due to the absence of qualified knowledge, professional rivalry, vested interest and the pull of expediency. Confusion is later supplanted by disappointment.

A rehabilitation plan is not something that is achieved by a sudden rush of enthusiasm with beautiful masonry housing an added wing on a local facility. Education has moved from the little red school house, medicine from the home remedy stage, and rehabilitation has gone beyond the merely palliative measure, such as the mere fitting of an artificial appliance, or the simple attainment of a job that neither supports one's family adequately nor continues to be available. *For rehabilitation is not a discrete moment in time but a series of connected events in the life process of development, maturation and decline.*

Rehabilitation must now move to larger overall planning on a community-wide basis with long-term, life-term architecture. There is a desirable trend at this time to form joint committees within the community in order to study, assess and plan for overall rehabilitation. Much of this planning, however, has been unsuccessful in terms of real accomplishment, since before the community begins to plan, its real basic needs are for commonly understood reference points for the prevention, correction or alleviation of disability. These criteria should consist of a philosophy and a definition of rehabilitation.

However, before these important elements of rehabilitation orientation are presented, it would be best to discuss part of the background of the chief issues.

Main Assumption

The main assumption of this article is that rehabilitation is essentially a community responsibility and that all resources residing in facilities and individual professional operations contribute to the pattern of the total process. Furthermore, it is the moral and ethical responsibility

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of all so concerned with treatment in a broad sense to fit their individual skills and prerogatives into an overall scheme so that their efforts may be most fruitful and the best interests of their patients or clients served. These rights, privileges and responsibilities which we as individuals hold are not lightly bestowed and should be held in equitable relationship to all other efforts devoted to these purposes. It means further that a sensitive perception should be alert to the moment when some other profession or resource is the immediate need of the patient or can exert superior long-term rectification.

Background of the Problem

Rehabilitation did not spring into being as a completely new process. It is the result of the evolution of a series of developing trends which have been brought into sharp focus and given a collective name, which is today a magic name—rehabilitation. The cultivation, restoration and preservation of human resources have not begun in our lifetime, but with the first concern of one man for another. For centuries we have been developing professional bodies of knowledge and such means as hospitals and institutions to prevent and rectify physical or mental affliction. The major trends which have accentuated this newer emphasis are: increased economic security, the growth and enhancement of democratic principles, a greater community sensitivity towards the well-being of its citizens, and finally, the development of specialization within professional fields, as well as the establishment of new professions in the treatment of human beings.

Specialization, for example, has many advantages, but it has brought problems. Not only has it become necessary because of increased knowledge, but specialization itself has added to the vast accumulation of information, much of which has not as yet been digested and assimilated. While it is true that through specialization—and by specialization I mean both what has happened within an existing profession as well as the newer professions—we have acquired the ability to define many problems better than they have ever been defined; yet in terms of effectiveness and balance in treatment, we often have not profited as much as we should have, and indeed, in some instances, have failed through our narrowness of perspective.

There is but one profession in dealing with a human being, and that is a profession which can deal with the organismic treatment of the patient. Actually, such a profession does not exist since artificial barriers have, by necessity, law, custom and education, subdivided knowledge into various professional fields necessitating the comprehension by each area of the interwoven fabric of its fellow professions. It must be recognized that there are no discrete categories of scientific endeavor. Professions are arbitrary classifications, so that fundamentally all treatment should be total treatment, not just medical or social or psychological, vocational or any other subdivision. The relative nature of truth must be clearly recognized in the assessment of a human being, since each described is not situated within a sharply outlined division, but merely views the problem from the vantage of one amorphous aspect.

The supposed "antidote" to specialization has been the "whole person" concept. Permeating every professional philosophy today is the admonition that one should "treat the whole person." Yet we all recognize that such an assignment is theoretically and practically impossible. It should result, however, in the professional person reaching out with a humble awareness of his limitations into other resources for his patient, client, or counselee. No profession is an island unto itself, but we can easily make islands of our own practices. We cannot be scientific unless we are realistic. We have postulated a conceit—a "superman"—for treatment to deal with the "whole person." Perhaps our first step to rectify this is to appreciate our own and our profession's limitations.

The difficulties the educator faces in professional education today are: to balance the general with the specific; the old fundamental subjects with new developments; and massive information with prevalent scientific techniques. Adding, in most cases, to an already overburdened curriculum is undesirable and realistically infeasible. The adoption of a new philosophy, however, may be the key, a philosophy which will bear in mind past fundamentals with the present changing conditions and serve to orient a fresher curriculum. It seems that we may need new reference points upon which to stake out our revised philosophy which will incorporate the common elements that exist in all our specialties, and through this synthesis expel the useless, the superfluous, the relatively less valuable. Of course, this is a constantly changing process which begins again and again in inevitable splitting and consolidating to reach for new perspectives.

There are several other attributes of the "whole person" concept which need to be considered. The first is the dynamic nature of a human being and, indeed, everything on earth, for as Wiener¹ says, "In the living organism as in the universe itself, exact repetition is absolutely impossible." Patients are not only unique as people, but the consequent manifestations of any phenomena, such as their disabilities, are also. Furthermore, the patient is different today from what he was yesterday or last month. True, he often moves within a certain framework of operations, but this circumscription may not be as well defined or as static as we think.

Further consideration would disclose that the "dynamic whole person" concept by itself is inadequate without adding "in his total environment." Again, these may be mere words to the many of us who see the patient or client in the artificial setting of our offices, but do not appreciate his everyday functioning in the community as a worker, a family man. Review for a moment the problem of a physician who may want to give counsel to the man whose heart disease limits his physical capacities. How well can he advise him without some appreciation of the specific demands of his work, his travel, his after-hours activity and the other demands upon his physical and psychic energies? Frequently there is the naive assumption that the casual and rather unsophisticated questions which the physician may ask of the patient will guarantee that proper information may be forthcoming. Yet one needs the insight and training to know what questions to ask, not only originally, but subsequently upon getting answers;

and furthermore, to know when the individual is speaking in ignorance, indulging in wishful thinking, or actually distorting the truth for reasons of his own.

Examine the question which often has been asked of an individual who is about to be ready for work after disease or accident. The individual may be asked by someone not familiar with the field of work, "What are you going to do about work?" The reply is frequently, "I'm going back to my old job." This actually may be expressed with apparent confidence and the questioner is satisfied. The vocational counselor, however, will ask further, "How do you know? Have you been in touch with your employer about this? Are you and he agreed on a starting date and when is it, etc.?" Frequently it is then apparent that actually little or nothing was done about the situation and that it is such an area of concern and worry that the individual prepares a statement suitable to the inquirer to prevent more painful prodding. Furthermore, the individual frequently will give an answer commensurate with what he conceives to be the interest, role, qualification and perception of the questioner.

One more essential of the "dynamic whole person in his total environment" concept is the addition of the phrase "with a full appreciation of his life term process." This would include not only an evaluation of the previous life history of the individual, but an anticipation of his subsequent development in society. It would consider the impact of his psychophysical nature in relationship to the many vicissitudes of living in order to help him avoid the pitfalls.

The ideal goal, then, is to try to understand the *dynamic whole person in his total environment with a full appreciation of his life term process*. It is evident that any one of us needs as much aid, counsel and advice as we can muster.

Rehabilitation seems to be a talisman to many persons and, while it is true that some of the changes which come about are remarkable, we cannot overlook the fact that it has many limitations. The more difficult a problem presented, the less chance there is for restoration. What does seem extraordinary to some is that the case they thought was hopeless turns out successfully, and the case they felt was relatively simple never progresses. It is, of course, all in the professional viewpoint. In rehabilitation, it is not the physical severity per se, but the *total severity*—physical, mental, social, vocational and economic in combination.

We have discussed some of the forces behind rehabilitation, but up to now have not spoken of just what rehabilitation might be. Rehabilitation may be defined in a variety of ways, depending upon the focus of treatment, what profession defines it and the setting in which it takes place. It is not a profession, and is certainly not a science. It is, rather, a philosophy—a set of purposeful intentions—and overlay of basic goals and realistically oriented attitudes on any profession, fortified by a number of modern methods and devices.

Is rehabilitation essentially a medical problem or a social problem or both? Is the question not so much where does rehabilitation fit into medicine

as it is where does medicine fit into rehabilitation? Furthermore, when does rehabilitation begin and when does it end? Who is responsible for it and where is it going? What are our responsibilities as professional individuals and as citizens in a community?

One would find considerable disagreement in the answers to these questions, because not only would there be a variation in philosophies, but certainly differences would arise because of one's own professional training and sphere of operation. Yet is it not time that we consolidate our philosophies into one which might serve the individual best, and define what we mean by rehabilitation so that all might contribute their best efforts to the well-being of the individual as a citizen in his society.

It is anticipated that a philosophy is not so much quarreled with as a definition. For in a sense, although one's philosophy about any important subject may be personal and unique, yet invariably, it is not so unique but that many, or even most others in the same field share it without too much essential deviation. A definition, although less important, is considered the first key to action and it is the implementation of any philosophy which brings about most disagreement. Yet, if all of us could agree on a philosophy, the definitions and actions that result would eventually fall into place quite well. Fundamentally, then, it is of essential importance that a philosophy be generally agreed upon, and not necessarily a definition.

Basic Assumptions

A philosophy based on the following assumptions is proposed:

1. *The continuity of the living process*, i.e., the actual or potential points of disability are present from birth or before and manifest themselves through life; the handicapped child is the adult of tomorrow, the healthy child is the arteriosclerotic at senescence. The need, therefore, to consider the life term process at all times, in all planning and programs, is apparent in order to provide a logical correlated attack.

It is evident that any treatment or any help we give a human being cannot be considered by us to be an isolated incident but a related event in the time binding process of his life. Furthermore, in a life process we may be continually treating the same person at various ages and stages of his disability. It is also evident that if rectification does not occur at one time or level, exacerbation will be the result later. We need the perception of relatedness between all time and developmental sequences in an individual's life, and between all professional endeavor for him.

2. *Man is an organismic whole; what affects one part of him affects all of him.* Furthermore, as internal and external forces act, he is ever changing and dynamic. He is not, therefore, merely a cardiac, polio, or cerebral palsy, but a person who has, among other influences, his physical or mental disability.

This is well accepted by all, but often only verbally and without full recognition of its implication. We are still treating the disease instead of the person and viewing the person from our own one-dimensional ap-

proach. We oversimplify our descriptions of his disability, classify him in broad groups and generalize aspects of his case. The advance of psychoanalysis, psychosomatic medicine, clinical psychology, medical and psychiatric social work, and the team approach of the rehabilitation center have done much to shake us from the comfort of simple categories. The rise of vocational guidance to a professional level has resulted in clarifying some of the important consequences of a man's work upon not only his physical disability, but upon his mental and emotional health. The man we saw two years ago may have the same name, but his disability or illness may now be modified by a wife and child, a new job with increased responsibilities, and certainly with a different attitude towards life and your advice to him.

When we ask the question, "When does rehabilitation begin?" we often hear, "At the bedside!" Just what this means is sometimes not clear. The physician's rehabilitation planning should be as clear in his mind as is reasonable under the circumstances, so that he may not only help the patient in his planning, but work with other professional groups who may be playing a role. Yet rehabilitation begins before the individual reaches the hospital: for adequate explanation and interpretation must be given to him to win his cooperation. In fact, *all factors* in rehabilitation, i.e., the physical, mental, social, vocational and economic aspects, play a part from the very beginning. The physical and mental sides are quite obvious. Examine the vocational side, however. How often will the surgeon orient an operation with full recognition of the consequences to the patient in vocational terms? The prosthetic aspect has now been recognized so that the stump may be the right length and best condition for a prosthesis. However, are elbows always stabilized at an angle most proficient to the individual's choice of occupation, cosmetic wishes, and general overall practicality?

Operations at poorly selected times may actually be so devastating to the individual because he was not ready psychologically that rehabilitation may not only be delayed but never take place satisfactorily. Furthermore, the whole question of necessity is obviously important, for the gain must be weighed against the entire situation. Also, of course, the question of possible deterioration in condition if the operation is unsuccessful must be carefully considered; for, while the physical loss may be minor, it may be enough to prevent the individual from carrying on his job, or tip the balance of his personal or interpersonal feelings with his family and associates. It is indeed an oversimplification to be direct about it and just ask him, for he may not be able to weigh these factors. Certainly, consultation with other professional disciplines should be absolutely essential.

3. *Man is a societal entity* whose nature we have divided rather arbitrarily into such designations as physical, mental, social, vocational, economic and spiritual, among others. It means that to understand him, one must take into consideration each of the highly developed professional groups which encompass these divisions as its chief emphasis, so that we may develop more intelligent plans and programs suitable for him as a citizen in his

community. Moreover, the problems of the disability affect not only the individual but his family, and eventually are borne by the community as a whole if a remedy is not forthcoming.

The individual cannot be isolated from his environment any more than a professional can be isolated from his own group, other professions, and other resources within the community constellation of services.

The community subtly prepares its citizens to assume their various responsibilities through the molding influences of its family life, educational systems, mores, religious institutions and other social media. The word subtly is used because often one does not recognize what is happening because of the gradual interrelated processes involved.

How strong the community builds its units depends not only upon the quality and availability of its major resources, but upon the presence or absence of other cultivating means such as maternal and child-care services, school health programs, adequate recreational facilities, opportunity for vocational guidance, provision for exceptional children, child guidance centers, adult counseling agencies, etc.

The child is transferred from one womb to another, and at the parturition of its adulthood is the product of community nurture as well as its parents'. The way an individual, his family, his physician, his friends react to his heart attack is already written in his personality development, the moral and psychic strength of his family, the education and competence of his physician, and the status of invalidism in the community. The individual, therefore, must be understood within the framework of his family as well as the crucible of the community.

4. *Man requires, in order to live, the exercise of his mental and physical constitution.* As a creature of society as well, a pressure exists which dictates that he live, at a very minimum, a non-destructive life or, in more positive terms, a constructive life. This minimum is increased by activities which may be called contributing, i.e., acts which are of direct or indirect benefit to his fellow men. This contributing phase may arise from merely self-care to the level of a productive life which, among other highly desirable aspects, should be one of some economic gain. It is therefore necessary for us, if we are to help him as a disabled individual, to provide him with the opportunity to reach as high a level of productive living as is commensurate with his capabilities—an "augmentative approach"²—which assumes that the fullest development of the individual's potentials is desirable even if it does not lead to a level of direct economic gain.

Actually, if a person does not live a useful life, all phases of his physical and mental being deteriorate, and the result is that he becomes a burden rather than an asset. Today, heart patients, in their recovery phase, are spending less time in bed, less time inactive, and a greater majority are eventually returning either to their old jobs or to useful productive endeavor.

However, we are often victims of our dichotomies of thought. For example, our usual method of dealing with and planning for human resources is to assume that either a man can work or he can't, i.e., either

he supports himself economically or he does not "work." We frequently fail to appreciate not only the satisfaction a man should obtain from his work beyond mere economic return, but often forget about all the other ways in which he can be useful *below* full production levels. Work, therefore, is an economic necessity, a psychophysical need and, as Menninger³ says, a means of psychic release and expression. Morally there would seem to be an obligation to supply him with the opportunity for contribution to himself, his family and, indirectly, to society through constructive, purposeful acts.

Not only should there be intelligent special job placement within industry, but planned procedures for retirement, part-time work, rehabilitation and sheltered workshops, home-bound industries and home visits by occupational therapists and other needed personnel. These people may help an individual leave his home for work of some kind, train him for work within his home, or merely utilize recreational activities as therapy, not only for the individual's enhancement, but for the peace of the family. The housewife with cardiovascular disease may profit, for example, by being taught work simplification methods. The small income from home work for grandpa may just keep the family in economic equilibrium. The self-care activities taught grandma may permit the married daughter to be relieved of her practical nursing role and to work a half-day in the local market. Selective placement in industry is an appreciation of the mature principle that everyone is limited in some fashion or degree, and that the real question is ability to do the task involved.

This philosophy of augmentation, of amplifying the opportunity of the individual to contribute, is not "pampering our citizens" as some might say, but it is *expecting them, through special help, to become less dependent and possibly independent*, if their abilities and our sciences can make them so.

5. *Professional definition of an individual's whole nature and total situation cannot be done by any one professional discipline.* However, due to the economic burden of professional cost, the less complicated problem must necessarily be handled by the one professional area into which the immediate and basic need falls. This science, hopefully as aware as possible of its position in the framework of the treatment sciences and of the attributes of the correlated areas and the community resources, must be sensitive to the other needs of the patient or client in order to call upon external help when needed. Unfortunately, in some cases, *the detection of need can only be accomplished by the profession which has been trained and experienced in the specific area of the need*, for it requires much developed insight to identify, delineate, and interpret the situation.

It is clear that complicated problems, which are more frequent than are often recognized, require the special approach of a team of professions. The setting for this operation may be a comparatively simple evaluative medium such as a Work Classification Unit, which consists usually of a cardiologist, social worker and vocational counselor, or a broader, more complex one such as a rehabilitation center which may offer comprehensive evaluation

and treatment in its various forms such as physical, occupational, speech and other therapies, counseling, psychotherapy, vocational or work therapy, vocational training, workshop experience, sheltered work and placement.

One often hears that "the doctor can do the whole job if he is a 'good' doctor and has, or will take, the time." If the problem is simple and uncomplicated (in a rehabilitation sense), this is true, but if "whole" is meant to be the same nature of the accomplishments which a team can and does perform, such a statement is invalid. For it is, first of all, an affront to the organized bodies of knowledge that rest in other professions; second, it indicates a lack of appreciation of the whole individual as a human being whose complications are today far from understood; and third, it casts some doubt upon the person's objectivity and exhibits a lack of appreciation of his own limitations—an unscientific attitude.

The method for handling the complicated case by a multidisciplinary approach is referred to frequently as "teamwork" or the "team approach." Whitehouse⁴ has defined clinical teamwork as:

... a close, cooperative, democratic, multiprofessional union devoted to a common purpose—the best treatment for the fundamental needs of the individual. Its members work through a combined and integrated diagnosis; flexible, dynamic planning; proper timing and sequence of treatment; and balance in action. It is an organismic group, distinct in its parts, yet acting as a unit, i. e., no important action is taken by members of one profession without the consent of the group. Just as the individual acts as an interrelated whole, and not as a sum of his characteristics, so must the professions act, think, interpret, and contribute toward a diagnosis which is the product of all, and a treatment plan which is dynamic to accommodate the changes which a dynamic human organism is constantly making. Rehabilitation group members require a firm foundation in one science, which must include a keen awareness of its limitations, an understanding of some of the fundamental philosophy, practices, and limitations of the companion and cooperating sciences, and an open, mature, flexible mind toward meeting new ideas and challenges.

There are, of course, all kinds of "teams" today, from the "home care team," "nursing team," "medical team," "work classification or work evaluation team," "rehabilitation team," to the "geriatric team."

The rugged individualist may observe that this is a good example of the spineless lack of enterprise and muddy thinking today. Yet we have really improved when we recognize the fantasy of power and control which motivated so many professional people in the past. Today we have been objective enough to recognize our own deficiencies and, although we are also aware of others' inadequacies, we fully respect their contributions. We are also sensitive to the extraordinary opportunities such close association provides for a type of interdisciplinary education which none of us received in formal training. The naivete of the past has been supplanted by the realistic specialists of today. We have stopped kidding ourselves about the magic of our ministrations. Hopefully we also have the maturity to recognize when another has more competence along a certain line than we ourselves do.

While the general background of the therapies today has much similarity, we are faced with an enormous body of new knowledge to be assimilated. Fortunately, the various kinds of teams are crucibles wherein, by the exchange of knowledge, perhaps some more integrating principles of treatment may be formed. To date, such teams have been rather intrigued

with their own process, since the uniqueness of their situations and the absence of method apparently have yet to be clarified.

One thing, however, must be recognized in our effort to "individualize" the patient: there is no end to it and it should be understood that some reasonable cut-off point is necessary. Yet the findings of so many actual or suspected physical ailments in a multiple screening process point out the need for better integration between the patient or client, the physician, hospital, rehabilitation facility and other professional disciplines.

6. *Disability problems are not unique and isolated.* Disabled persons, especially in the older age bracket, often may have one or more so-called secondary disabilities. For example, the cardiac may also have tuberculosis, polio, diabetes, amputation, cancer, or such other complicating factors as low mentality, poor education, emotional disturbances, and poverty. In terms of his total ability to be effective, these conditions may actually be the primary disability and unrecognized as such, while we, from our own professional eyes, focus upon the "major" difficulty. Furthermore, many disability problems are similar in kind to those of other disabilities. It is, consequently, of importance to recognize that we need not only be concerned about the whole field of rehabilitation because of its inter-relatedness with any single disability problem, but also, in addition, to appreciate that we are not in this alone, since other persons or agencies may be dealing with the specific disability of our concern as a secondary disability or with the consequence of the specific disability. Furthermore, not only may the disability affect the individual's work, personal and social life and that of his family as well, but certain generally deleterious conditions previously existing, such as poor nutrition, over-work, unsanitary living conditions, low economic level, etc., may have induced or deteriorated the disabling condition. Since one must be concerned with prevention, this is further evidence that one must look at the disabled person as a whole person in a family circle and as a community unit.

7. *As professional people, our responsibility to the disabled individual should be one of participation and cooperation with community habilitative and rehabilitative facilities.* This attitude is not only a logical and economically sound one, but surely one for ethical consideration. If we wish our patient or client to have full opportunity for development or restoration, we are required to find methods of not only understanding what might be offered, but of seeking ways of exchange and communication.

Rehabilitation should encompass more than the adult of employable skills. There is no sharp line between various levels of work and between a person infeasible for employment and one acceptable. For maximal results and because their funds are limited, the Federal State System of Vocational Rehabilitation has accepted an imaginary cut-off point of service and called those falling on one side vocationally acceptable and those on the other, "infeasible." However, many other community agencies have taken the responsibility for preparing and upgrading individuals to a point of acceptance by Vocational Rehabilitation and also have tried to assume the burden of those who will never reach acceptance, as well as those who have

passed the peak of regular employment. Furthermore, the Divisions of Vocational Rehabilitation have concentrated usually upon employment in a somewhat narrow sense, again leaving in some cases many other social, psychological, economic, medical and even vocational problems for other agencies, for they cannot carry the burden alone.

There are, consequently, many gaps in rehabilitation services in most communities to be filled by the individual professional and the private and voluntary health agencies. However, all groups in the community should recognize two important facets of this problem. First, that the disabled individual is a whole man who happens to have a disability, and second, that since one cannot afford to supply him with all the necessary services, it must, as a fragment of the whole body of community service, join with others in the common effort to preserve the self-dependence of the individual. Therefore, each should locate its area of prerogative and attempt to mesh its contributions within the local community structure.

The physician may very well ask, "How may I obtain further aid for my patient? What is available? Does my patient qualify? Will I lose my patient? How can I be sure that I will approve of the way in which they will handle him?" Unfortunately, at this time, unless the physician has been exceptionally interested and active in community resources, he will not be able to get these answers easily. The average community is pretty much unorganized to answer these questions clearly. Some medical societies have on their staff a medical social worker to help solve this problem. As may well be recognized, this is a first step, but it is very much of an oversimplification. To put it briefly, one must not only know what services are available and where, but what the patient's most pressing needs are: should it be a family case work agency, an employment service, a rehabilitation workshop, a Division of Vocational Rehabilitation? While it is true that referral to some substantial agency will probably eventually result in referral to the proper agency, yet the physician does not have available to him enough reliable criteria. He can, of course, go by what he knows of the patient's situation. He can decide on the basis of what the patient asks for, or what the family claims it needs. Yet much time is wasted in this fashion—the patient's time, the agency's time, and professional time.

The solution may be found in a central referral agency that can review the physician's findings, evaluate the patient or client's needs for service from a multi-disciplined standpoint, and then, in cooperation with the physician, refer with adequate information to the agency selected as most suitable. This central referral agency could also perform, of course, much valuable service in terms of evaluation for the smaller, one-dimensional agency.

The Work Classification Unit, or as it may be called, the Cardiac Work Evaluation Clinic, is a small counterpart of such a central referral agency. Such a Unit is not only useful to the physician, but to industry, other social agencies and to the Divisions of Vocational Rehabilitation and the State Employment Services. Obviously any community needs a facility which can define accurately the work capacities of its disabled persons. It needs,

however, much more than this. The comprehensive rehabilitation center is closer to filling this need, not only total definition, but for other rehabilitative service activities.

8. *Only the broadest community approach can define, interpret, influence, and effectuate a program that will provide the disabled person with full opportunity for self-dependence and for complete citizenship.* This means that the entire community must plan for its rehabilitation needs. Its first hurdle is its tendency to oversimplify rehabilitation. It is, of course, not mere physical restoration or vocational achievement. The task of rehabilitation does not belong exclusively to one agency, group or profession. It is a community responsibility that requires community evaluation and community action.

The very fact that there are frequently so many services operating with independence and exerting their own initiative does not guarantee continuity of care, nor connection between stages of severity of disability, and certainly does not provide for a total comprehensive view of an individual's problems. The community as a whole should first recognize its obligation; second, enumerate its needs; third, consolidate its present efforts; and finally, plan, if necessary, for increased facilities—yet not before inculcating a “rehabilitation emphasis” or viewpoint in all its treatment activities.

Quite a few communities are in the early stages of enumerating their assets and comparing them with their needs, and are attempting to determine what their real needs are. Unfortunately, up to this time there has been but little help available to them. Some have invited prominent persons in the rehabilitation field who have sold them upon an oversimplified version of rehabilitation—chiefly, physical medicine. The local hospital has added a wing, called it a Department of Physical Medicine and Rehabilitation, and the community has relaxed. The more perceptive, however, are recognizing that the problem has hardly begun to be solved and that perhaps this was not necessarily the first step.

Some communities have rather skipped stage three, that of consolidating their present efforts, and established a new facility as mentioned above. The “sheltered” workshop has been the goal in other cities, and some new ones have been established along more progressive lines which result in what might be termed a “rehabilitation” workshop, although it might actually be called a rehabilitation center, curative workshop, or “city” workshop. The “sheltered” workshop is the most prevalent type and does little rehabilitation work in a real sense. It is frequently a shelter from which some raise themselves, but many, in the absence of professional personnel and a rehabilitation viewpoint, actually dig a deeper hole of dependency from which there may be no return. The present day “rehabilitation” workshop, because of a newer philosophy and professional measures, endeavors to shelter as few as possible for as short a time as necessary. Its objective is to use the workshop as a short vestibule, or a hardening period for the client (either physically, psychologically, or both) before he leaves the facility and maintains himself in the community. Not only are more people returned to the community, but the population has a rapid turnover

as compared with the "sheltered" workshop, and consequently many more people are served over a period of time and, of course, in a more professional fashion.

Some communities have fallen into the trap of determining that they need more "sheltered" workshops because it is easy to see and count a lot of disabled and/or elderly persons. This is akin to determining that we need fewer physicians and larger burial grounds. While there are usages for sheltered shops in every community, some communities have enough of these and need, much further up the scale, a rehabilitation facility such as a comprehensive rehabilitation center to prevent, restore or delay the need for the terminal sheltered shop.

The communities that have ducked the problem of "consolidating their efforts" have done so because of the immediate battle that arises in allocating prerogatives between groups. It is rather fashionable for a facility at present to talk of plans for a complete rehabilitation service, whether it is equipped by function, knowledge or finances to really do so. The question is not so much how many rehabilitation services should a hospital, or a convalescent home, or a rehabilitation workshop have, but how does this activity coincide with its area of competence and how does it fit into the community pattern for rehabilitation. It is far better for an agency to grow vertically in its area of best function than to spread constantly in a broad horizontal pattern into the area of its neighbors. This tendency is probably the result of two things: the prestige of a rehabilitation program and a commendable effort to deal with the whole person in his total environment. The way out of this dilemma may be fewer agencies and more comprehensive ones.

One method which the community might use to improve its efforts in rehabilitation is to place a "rehabilitation emphasis" upon all its individual activities. This principle may be summarized by saying it is an awareness of the final development, the steps leading to this end result, and a consideration of the total patient or client situation in the community pattern of services. From whence the individual comes, where he goes and what happens to him is of importance to all of the various segments that may be dealing with him.

Finally, the community, that accepts as a group a common definition of rehabilitation that will be useful to the entire civic body, regardless of how individual groups or professions define it, is evidently better prepared for concerted action.

9. Increased community rehabilitation services are in the offing. It is evident that local communities are more and more interested in the creation of better, more substantial, locally available, comprehensive rehabilitation services than ever before. The last several years have seen the origination of an additional number of voluntary health agencies established by public interest. These inevitably create a desire for better treatment, research, and facilities. The increasing challenge of aging, the greater sensitivity to and concern for problems of disability, a recognition of the high cost

of neglect, the loss of potential or actual wage earners, the inter-relatedness of social disasters, etc., all are contributing to a demand for definitive answers and services.

A Definition of Rehabilitation

The original, and still widely held, definition of rehabilitation which was adopted by the now defunct National Council on Rehabilitation in August, 1943, stated, "Rehabilitation is the restoration of the handicapped to the fullest physical, mental, social, vocational and economic usefulness of which they are capable."

Webster's New International Dictionary defines "rehabilitate" in its most useful meaning to us as "to restore a person, as a disabled soldier, to a status of independent earning power through a course of instruction under state supervision, especially along vocational lines."

The first National Conference on Cardiovascular Diseases held in 1950 under the joint auspices of the American Heart Association and the National Heart Institute of the United States Public Health Service defined rehabilitation as: "The return of a person disabled by accident or disease to his greatest physical, mental, emotional, social, and economic usefulness, and, if employable, an opportunity for gainful employment."

All of these definitions are restrictive since they initiate their description with the words "restore" or "return." The main stream of rehabilitation in the past and even today is focussed around the employment and restoration of an individual disabled by disease or accident, and since the Federal-State system of rehabilitation, the Veterans Administration, Mutual Accident and Surety Companies, State Employment Services and others are devoted primarily to the injured adult of working age, these definitions are adequate. Moreover, the books on rehabilitation have stressed the injured workman, the disabled soldier, or adult civilian.

Other definitions are restrictive in various ways, for under some, rehabilitation is considered a medical problem with social and economic aspects, in contrast to those who might term it a social or community problem with medical, social, psychological, and vocational aspects.

There is little danger in defining the concept so that it is most suitable for your needs or your setting. The harm might come in the application of a restrictive definition in areas in which it does not serve the best interest of the patient or client and his destiny. Dr. Howard Rusk speaks of rehabilitation as the "third phase of medical care" which "takes the patient from the bed to the job." This definition is noteworthy as a beacon for the physician to recognize that before, during, and after treatment he must think of the final goal involved. At its level and within its purpose, this definition is satisfactory. But beyond this point, it may distort a proper system of values. For this is not a definition fully useful to a community planning rehabilitation, to a comprehensive rehabilitation center, to a school for crippled children, to a local division of vocational rehabilitation, or to a Rehabilitation Committee of a large voluntary health organization.

Congenital or early disabled young persons have often been neglected, at least in a rehabilitative sense, until they reached an age where the usual rehabilitation resources come into effect, and at that stage the typical services are geared for a certain minimum work sophistication. Since this early disabled group frequently lacks the maturer experiences, work skills and work history of the adult disabled, this group is rather patently or subtly unprepared to profit by these facilities.

This led Whitehouse⁵ to use and to attempt to define the word "habilitation" in terms of identifying this group, its needs, and the type of treatment required. It was more than a quibble about terms, since a word is needed to characterize a somewhat distinct group needing a different approach, set of values, an altered program, and a special matrix.

The field of the aged is, at this time, designated as gerontology. It is clear that these experts recognize the irreversible process of aging and, while the desire is "to restore or return" if possible, ostensibly the process is more one of the conservation of remaining skills and abilities—the holding on to what one has as long as possible.

The importance of proper definition in specifying an area of operation is unquestioned. Yet there is another paramount factor here—the *extreme significance of correlation and of inter-dependence*. For it is only by an appreciation of the situation that in a life process we may be continually dealing with the same person at various ages and also stages of his disability. Furthermore, a connection exists between these ages and stages, and if prevention does not occur at one time, exacerbation will be the result later. Therefore, since rehabilitation is a community problem with many professions and community services playing a major or minor role, depending upon the nature of the disabled individual's situation, we need a *definition which will orient and encompass a connected series of preventive and service programs for disabled individuals of every age, level of severity and special circumstances*.

By a comprehensive definition there exists the advantage of seeing the problem as a whole, of acquiring a proper set of values and emphasis on what must be done first and what second, and finally, the advantage of knowing one's goals and planning for the future. Additionally, much treatment and service of all kinds is segmentary, and if we are able to orient all treatment or service personnel to understanding where they fit in the scheme of things, what comes next and what has gone before, we should be improving their function.

A definition applying to any disabled person, in consideration of the need for a community interpretation, a definition which would include the young, the adult and the aged in all their capacities and possibilities, might be: *Rehabilitation is the Cultivation, Restoration and Conservation of Human Resources*.

Cultivation is considered primarily to synopsize all the preventive and developmental acts, experiences and treatment which the young or early disabled may need.

TABLE I
CULTIVATION, RESTORATION AND CONSERVATION
OF HUMAN RESOURCES
(a Scale for Community Planning)

[illegible]

Restoration is considered to characterize primarily the activities usually conceived under the terms "restore" and "return" for the large area of maximum adult usefulness.

Conservation is meant to imply all the preventive and preservative acts that would permit those beyond restoration to yet retain their maximum capacities as long as they are able.

It is recognized, however, that each of these three terms do, to a certain extent, interpenetrate the others.

Human Resources is defined by the *Dictionary of Education* as, "all the physical, intellectual and spiritual energies, abilities, capacities, and ideals of an individual or a society."

It is hoped that this definition, while broader and more general than most would wish it, implies: a life-process view, the inclusive need for all ages, the necessity for prevention and planning, a meeting-ground for individual professional definitions, the consideration of a whole person in a societal setting and finally, might be of use to a community which has broad problems. The important thing is not this particular definition, but that such a rallying point is necessary.

A Reference Point for Community Planning

The application of this philosophy and definition has been attempted in a typonymic schema Table I. There are other frameworks which could be and should be used as reference. One might construct, for example, an age continuum from 0 - 125+ years in which programs, plans, gaps in services, etc., could be listed to inspect the rehabilitation situation of each age group. The present schema has some reflection upon an age range; however, its thesis is essentially that of the application of a psychophysical being to the fullest utilization of his capacities through an augmentative approach. The items or goals are selected somewhat arbitrarily but with a view towards an ascending order of usefulness. While there is a zero point and a 100 point, both of these are arbitrary, as well as the points in between, for actually an individual might be a better and happier citizen remaining at an apparently lower level of contribution. Furthermore, volunteer work in the community could be in some cases of the highest order, and the best homebound worker might, of course, be a better economic producer than someone outside in the factory, etc. However, this chart is meant to represent opportunities for all citizens and, obviously, individual cases will vary.

This rehabilitation schema may be used in a number of ways:

1. To set practical goals for increasing the contribution (augmentative approach) of the patient or client.
2. A reference point for a community picture of services. By listing community agencies as a series of low rectangular boxes encompassing the areas of their services, a visual picture of coverage is presented.
3. A determination may be made of what gaps exist in service or where service is weak. An inspection of the left column will reveal some proposals for further study of the services and possible considerations for action.

4. An individual facility can determine where it fits in relationship to surrounding agencies and perhaps determine how and in what direction it should expand if it is to do so.

5. Two or more agencies can determine how they can fill the gap that exists between them, or the community can decide that it needs a new facility.

6. Voluntary health agencies can decide where to bring program, information and education to areas that require them.

7. It will be obvious at the point marked "retrogression" that the word "conservation" in the definition comes into play. Our oversimplified thinking of "work or not," or "work or retirement" should be replaced by a tapering off continuum view of gradations of lesser work.

8. Duplications, strong and weak areas of cooperation, co-sponsorship of activities and long range planning can be estimated and projected. Each community should develop its own framework and it should be obvious to all facilities that regardless of the area in which they exist, that they are part of an overall pattern of rehabilitation and that each plays an important role.

It is agreed that a continuum framework has many limitations, but it may be a step beyond a segmentary view.

CONCLUSION

In a democratic society, we have no alternative than to recognize the individual's right to be aided to as much independence as is his desire and capacity. Furthermore, the economic welfare of the community demands the maximal utilization of all persons. Coincident to these is the realization that there are no dividing lines between health and disease, between work and inability to contribute.

All of the humanistic treatment professions and agencies are furnishing various parts of the total community constellation of services. The efficiency of the entire effort may be enhanced if a common philosophy, definition and integrated plan are instituted for channeling the best efforts of all professions and groups.

There are no dividing lines in the professional treatment of a human being other than arbitrary, for the human system is one. There have been, however, various assigned tasks established loosely by custom, law, education or inclination called professions. Furthermore, there are other conceptual frameworks such as preventive medicine, public health, and rehabilitation which may encompass several professions and overlap in activities. It may be possible under a more general unified concern such as *human resources*, for all to recognize many of the same things we are calling by various names or viewing differently because of diversified assumptions or philosophies. There is evidently a tremendous amount of agreement and an opportunity for still further concordance. Our efforts should be greatly rewarded by new knowledge and by knowledge in greater depth and clarity, if the many missing pieces are identified in a total framework of best human care.

There may be, for example, the public aspects of rehabilitation and the preventive medicine aspects of rehabilitation. The concept of "habilitation" in rehabilitation would evidently include not only the medical but also the social, psychological and vocational, since the basic orientation is one of total development towards a mature citizenship. The preventive aspects of public health are also contributing to this goal, but possibly in a narrower sense.

If there is a greater misfortune than to lose our purse or our good name, it is to lose precious time in argument. We can agree that our goal is the best "treatment" of *homo sapiens* and therefore meet in common spirit. While we should encourage debate to clarify our issues, we cannot afford to waste our efforts in settling minor differences one by one. If we can agree on a fundamental framework and attempt to define the basic concepts of this unitary system, we shall make more substantial progress.

As the servants of man, our privileges stem from the essential moral principles which we all accept. The real violation is the assumption of prerogatives when we have neither the knowledge nor competence to assume them. Above all things, may we have the humility to open our minds to the intellectual problems involved and our hearts to the humanitarian necessity to do so. We are fortunate to begin with the same precept—service to mankind.

The opinions expressed in this article are those of the author and do not necessarily represent the official views of the American Heart Association.

RESUMEN

La rehabilitación debe definirse actualmente de manera más amplia puesto que el concepto debe extenderse básicamente a toda la práctica médica y no médica. Puede definirse como "El cultivo, restauración y conservación de los recursos humanos." Esto incluiría todas las edades, estados de incapacidad y niveles de circunstancias.

El desarrollo de la rehabilitación como concepto ha agregado amplias vistas a la práctica, a la salubridad pública y a las ciencias sociales. Porque si en el pasado la rehabilitación se concebía estrechamente como el proporcionar aparatos artificiales y una ocupación, una corrección que en su tiempo fué adecuada, ahora debe considerarse como una serie de acontecimientos conectados en el proceso de la vida en desarrollo, maduración y declinación. En otras palabras, no sólo consiste en medio y técnica que han de usarse cuando estén indicados, sino también una filosofía que debe empujar todas las medidas desde el principio.

Como una filosofía, intenta hacer resaltar la importancia de la persona en conjunto en su medio total con el uso mejor de sus capacidades orientadas hacia actividades constructivas y productivas.

El desarrollo del individuo en un estado saludable en medio sano no es bastante. De hecho un hombre no permanecerá sano de espíritu y de cuerpo ni llegar a su máximo, si no le damos oportunidad para un ejercicio adecuado e inteligente de sus capacidades mentales y físicas.

En otros términos, el hombre necesita hacer participar su mente y su cuerpo y necesita una incitación de su espíritu para llegar a un estado de salud.

El trabajo por tanto en el sentido de la aplicación útil del ser psíquico-físico para el manejo del medio que nos rodea para lograr un fin constructivo, es no sólo necesario económicamente sino también lo es terapéuticamente. En tanto que la rehabilitación fué concebida originalmente como recolocación en empleo remunerado ahora debe incluir las personas de todas las edades, estados de incapacidad y niveles de condiciones como un es fuerza para permitir que los no capacitados para incorporarse a las fuerzas de trabajo corriente puedan contribuir con lo que puedan hacer y agregarlo al conjunto de los recursos humanos.

Si bien en algunos casos esto puede producir beneficios menores, es sin embargo importante terapéuticamente y también se justifica como humano y como una extensión de los principios democráticos.

La rehabilitación es una responsabilidad de la comunidad. Todos los grupos profesionales o no han de contribuir en el esfuerzo. Es importante por tanto para el médico para otros profesionales tener una filosofía amplia acerca de la rehabilitación y buscar ayuda para sus enfermos o clientes de otras profesiones o recursos colectivos de modo el hombre "todo" puede ser beneficiado.

Una integración de los conceptos de medicina, salubridad pública, ciencias sociales y rehabilitación dentro de un plan conceptual de mejoría del tratamiento y de la mayor y mas complete utilizacion de los recursos humanos se avizora en un horizonte de esperanza.

RESUME

La réadaptation devrait comporter actuellement une plus large attribution parce que sa conception devrait être étendue d'une façon plus extensive dans la pratique médicale et non-médicale. Elle peut être définie comme la "mise en valeur, la restauration et le maintien des ressources humaines." Ceci comprend tous les âges et les degrés d'incapacité, et toutes les éventualités.

Le développement du concept de réadaptation a étendu le domaine de la médecine privée, de l'hygiène et des sciences sociales. Alors que dans le passé la réadaptation était conçue d'une façon étroite comme l'occasion d'une occupation artificielle et un passe-temps, peu à peu cette conception se trouva modifiée. Maintenant il faut la considérer comme une série de phénomènes liés à la vie et comprenant le développement, la maturité et le déclin. En d'autres termes, il ne s'agit pas seulement d'un moyen ou d'un procédé qui peut être utilisé selon certaines indications, c'est aussi une philosophie qui devrait permettre tous moyens de traitement dès l'extrême début.

Comme philosophie, elle essaie de mettre l'accent sur l'importance de la personne considérée dans son milieu ambiant et employée au mieux de ses capacités, en vue d'activités efficaces, constructives et productives. Le développement pour l'individu d'une bonne santé dans un milieu sain

n'est pas un but suffisant. L'homme ne restera pas dans de véritables bonnes conditions de corps et d'esprit et n'atteindra pas vraiment sa meilleure condition si on ne lui fournit pas la possibilité d'exercer d'une façon intelligente et profitable ses capacités mentales et physiques. En d'autres termes, l'homme a besoin de l'engagement total de son corps et de son intelligence, et de la lutte de son âme pour réaliser l'état de santé.

C'est pourquoi le travail, dans le sens large d'application psychologique est non seulement nécessaire économiquement, mais aussi du point de vue thérapeutique. Tandis que la réadaptation, selon la conception du passé, était la restauration à un emploi économique, elle devrait maintenant comprendre des personnes de tous âges, à tous stades d'incapacité. Celles qui ne peuvent être absorbées dans la masse laborieuse normale pourraient néanmoins contribuer d'une façon rentable aux services et activités compatibles avec leurs capacités et augmenter ainsi le potentiel des ressources humaines.

Bien que dans quelques cas le rendement économique puisse être mineur, il faut cependant maintenir ce principe au point de vue thérapeutique, ainsi qu'au point de vue humain et enfin en accord avec les principes démocratiques.

La collectivité porte la responsabilité de la réadaptation. Tous les groupes professionnels contribuent et participent à l'effort total. C'est pourquoi il est important, pour le médecin et pour tous les membres d'une profession, d'avoir une large conception de la réadaptation, et de chercher à aider leurs malades de façon à ce que l'homme puisse être totalement utilisé.

On peut espérer dans un proche avenir une intégration des conceptions de la médecine, de la santé publique, des sciences sociales et de la réadaptation en un ensemble équilibré qui permette l'amélioration des traitements, et l'utilisation plus complète des ressources humaines.

ZUSAMMENFASSUNG

Die Rehabilitation muss heute eine allgemeiner gehaltene Definition erfahren weil der Begriff mehr als Grundlage bis in all ärztliche und nicht-ärztliche Praxis reichen muss. Sie kann definiert werden als: "Die Ausbildung, Wiederherstellung und Erhaltung menschlicher Fähigkeiten." Dies würde alle Lebensalter, alle Grade der Arbeitsunfähigkeit und alle Lagen der Umstände einschliessen.

Die Entwicklung der Rehabilitation als Begriff hat zu einer Ausdehnung der privaten Praxis, des öffentlichen Gesundheitsdienstes und der sozialen Wissenschaften geführt. Denn während, wie in der Vergangenheit, die Rehabilitation nur eben für eine Ergänzung einer künstlichen Anwendung und für eine Beschäftigung gehalten wurde—eine Berichtigung, die zur radadau Zeit in einem unauffälligen Moment stattfand, muss man sie jetzt betrachten als eine Reihe von unbeinaurder zusammenerlangerden Vorfällen in dem Lebensprozess von Entwicklung, Reifung und Verfall. Mit anderen Worten ist sie nicht nur ein Mittel und eine Technik, von der bei gegebenen Indikation Gebrauch gemacht wird, sondern auch eine Philoso-

phie, die schon von Anfang an all Behandlungsmassnahme durchdringen muss.

Als Philosophie unternimmt sie es die Bedeutung der ganzen Person in ihrer gesamten Umwelt hervorzuheben mit der bestmöglichen Benutzung seiner auf nützliche, schöpferische und fruchtbare Tätigkeit gerichteter Fähigkeiten. Die Entwicklung des Individuums zu einem gesunden Zustand in einer gesunden Umgebung ist nicht genug. Tatsächlich wird ein Mann nicht an Geist und Körper gesund bleiben, noch seine Leistungsspitze erreichen, wenn wir ihn nicht mit der Möglichkeit ausstatten zu einem angemessenen und klugen Gebrauch seiner geistigen und körperlichen Fähigkeiten. Mit anderen Worten, der Mensch braucht die Beschäftigung für seinen Geist und Körper und eine Herausforderung für seine Seele, um ein gesundes Stadium zu erreichen.

Daher ist Arbeit im breiten Sinn einer nützlichen Verwendung des psychophysischen Seins zu Beeinflussung der Umwelt, u mein positives Ziel zu erreichen, folgerichtig nicht nur wirtschaftlich erforderlich, sondern auch therapeutisch. Während die Rehabilitation, wie sie ursprünglich aufgefasst wurde, als die Wiedererlangung einer wirtschaftlichen Stellung galt, soll sie jetzt Personen aller Altersklassen und Grade der Erwerbsunfähigkeit und Lagen der Umstände einschliessen in der Bemühen, denjenigen, denen es nicht möglich ist, in dem regulären Arbeitszwang unterzukommen, zu ermöglichen, aufbauend solche Dienstleistungen und Tätigkeiten beizusteuern, wie sie in ihrem Vermögen liegen, und so einen Beitrag zu liefern zum Gesamtaufkommen menschlicher Hilfsmittel. Auch wenn damit in manchen Fällen ein etwas geringeres wirtschaftliches Wiederauftreten verbunden ist, ist dies trotzdem therapeutisch wichtig und gerechtfertigt als humanes Verhalten und als eine Ausbreitung demokratischer Grundsätze.

Die Rehabilitatin liegt in der Verantwortlichkeit. Alle professionellen und Laiengruppen tragen dazu bei und sind in ihrem Beiträgen verbunden mit der Gesamtleistung. Es ist daher von Wichtigkeit für den Arzt und für alle professionellen Vertreter, eine umgreifende Auffassung von der Rehabilitation zu haben und Hilfe zu suchen für ihre Patienten oder Klienten aus anderen Berufen und Hilfsquellen der Allgemeinheit, sodass damit dem "Ganzen" Menschen gedient ist.

Die Herstellung einer Ganzheit aus den Auffassungen der Medizin, des öffentlichen Gesundheitswesens und der sozialen Wissenschaften sowie der Rehabilitation zu einem ausgewogenen begrifflichen Schema für die Verbesserung der Behandlung und der weitergehenden Nutzbarmachung der menschlichen Hilfsquellen erscheint hoffnungsvoll am Horizont.

REFERENCES

- 1 Wiener, Norbert: *The Human Use of Human Beings*, Doubleday, Garden City, 1954, p. 48.
- 2 Whitehouse, F. A.: "The 'Augmentative' Approach to Habilitation," *Cerebral Palsy Review*, 15:11 (Mar.), 1954.
- 3 Menninger, K. A.: *Love Against Hate*, Harcourt Brace, 1942.
- 4 Whitehouse, F. A.: "Teamwork: a Democracy of Professions," *Exceptional Children*, 18:46 (Nov.), 1951.
- 5 Whitehouse, F. A.: "Habilitation-Concept and Process," *J. Rehabilitation*, 19:3 (Mar.-Apr.), 1953.

Ototoxicity from Intermittent Streptoduocin Therapy of Pulmonary Tuberculosis*

A Study of One Hundred Five Patients Treated Eight to Ten Months

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In 1954 Cline, Houseworth and Pitts reported on an ototoxicity study of 100 patients treated in this institution with intermittent streptomycin. It was felt that this study should be compared with a similar series treated with streptoduocin, a mixture of equal parts of streptomycin and dihydrostreptomycin, to see if there was any significant difference in a degree or type of ototoxicity.

Materials and Methods

A group of 105 hospitalized pulmonary tuberculosis patients were treated for a minimum of eight months and a maximum of 10 months. These patients were mainly young adult men; all received two grams of streptoduocin intramuscularly every third day for six months after which the dose was reduced to one gram every third day. In addition, all of them received isoniazid and/or para-aminosalicylic acid orally. None in this series had more than 30 days of streptomycin or dihydrostreptomycin or other ototoxic drugs within 12 months prior to the study. Audiometer testing was done with a model H-1 maico audiometer, and vestibular function was tested grossly by means of an ice water test, as described in the earlier report.¹

Arbitrary criteria for evaluating the degree of dysfunction have been defined as follows:

1. None—less than 10 db loss of hearing and/or nystagmus of 90 or more seconds.
2. Slight—loss of 10-20 db and/or nystagmus of 75 to 89 seconds.
3. Moderate—loss of 21-30 db and/or nystagmus of 50 to 74 seconds.
4. Severe—loss of more than 30 or more db and/or nystagmus of less than 50 seconds, including no reaction.

For purposes of evaluation the audiograms have been divided into two groups—the low or conversational frequencies represented by the 512 through 2048 cps range and the high tones represented by the frequencies of 4096 to 8192 cps.

Results

As noted in Table I, 43 (40.9 per cent) of the total series showed either some degree of dysfunction at the end of eight to 10 months of therapy or an increase in their original dysfunction. Eighty-five per cent of these abnormal results revealed only slight dysfunction and 7.5 per cent abnormal

¹From the Pulmonary Disease Service, Fitzsimons Army Hospital, Denver, Colorado.

*The Streptoduocin was furnished by the Chas. Pfizer Co., Inc. in the form of Combi-strep.

tests fell in each of the moderate and marked categories. However, only four (3.8 per cent) of the total series showed any clinical hearing loss during the period of study and in all four instances the clinical degree of loss was slight. No patients in this series suffered dizziness.

Our observation showed the majority of the loss occurred in the higher frequencies and was only of slight degree. This was essentially the same experience as noted in the series with streptomycin alone. Only three patients in the entire series showed isolated vestibular dysfunction and this was only of slight degree. Only one showed audio loss and slight vestibular dysfunction.

In this series 70 (66.7 per cent) of the total showed some degree of audiometric hearing loss on the initial examination. However, with but one or two exceptions, none of them had significant clinical loss of hearing to begin with. These patients were deliberately included in the series in order to evaluate the effect of drugs on pre-existing auditory impairment. Table II shows the breakdown and follow-up on these cases. It is to be noted that 71.2 per cent showed no change or better readings at the end of the study than at the start, 22.2 per cent were slightly worse, 3.3 per cent were moderately worse and the remaining 3.3 per cent were markedly worse at the end of the study. It is also worthy of comment that three out of four noted to be moderately worse and three out of the four found to be severely worse were from the group with original hearing impairment. The original hearing loss group also includes three of the four who had some clinical hearing loss during the course of therapy. All of the patients found to be moderately or markedly worse than at the start of the study had their impairment in the higher frequencies. Furthermore, 19 of the 20 who were slightly worse started off with impairment in the higher frequencies only. Our observations indicate that most of the worsening was in the group who started off with a slight or moderate impairment in the higher frequencies only.

TABLE I
DEGREE OF OTOTOXICITY IN 105 PATIENTS TREATED 8-10 MONTHS
WITH INTERMITTENT COMBINATION STREPTOMYCIN-
DIHYDROSTREPTOMYCIN THERAPY

FACTOR		Number Pts with Dysfunction	Degree of Dysfunction			Clinical Hearing Loss	Clinical Dizziness
			Slight	Moderate	Marked		
Loss in 512-2048 cps Only		4	4	0	0	1-slight	0
Loss in 4096-8192 cps Only		25	23	1	1	0	0
Loss in both (512-2048 loss) ranges—(4096-8192 loss)			8	2	0		
		10	6	1	3	3-slight	0
Abnormal Icewater Caloric Test	Isolated	3	3	0	0	0	0
	With Audio Loss	1	1	0	0	0	0
TOTALS		43	45	4	4	4-slight	0
PER CENT		40.9 Pt Series	85*	7.5*	7.5*	3.8 Tot Pts	0

*Per cent abnormal tests. 53 = 100% abnormal tests.

TABLE II
PATIENTS WITH INITIAL HEARING LOSS BY AUDIOGRAM TREATED
8-10 MONTHS WITH INTERMITTENT STREPTOMYCIN-
DIHYDROSTREPTOMYCIN THERAPY

	No. Pts.	Findings at End of Study				
		Initial Findings	Better or No Change	Slightly Worse	Moderately Worse	Markedly Worse
512-2048 cps Only	0	0	0	0	0	0
4096-8192 cps Only—Slight Moderate Marked	50	26	11	13	1	1
		10	5	4	1	0
		14	11	2	1	0
Initial Loss in Both Ranges:						
512-8192 Slight Moderate Marked	20	11	11	0	0	0
		5	4	1	0	0
		4	4	0	0	0
4096-8192 Slight Moderate Marked	20	4	3	0	0	1
		5	4	0	0	1
		11	11	0	0	0
TOTALS	70	90	64	20	3	3
PER CENT	66.7*	100**	71.2	22.2	3.3	3.3

*Per cent of patients with initial audio loss.

**Abnormal tests initially.

Table III shows the comparison of the results of this study with the previous study using streptomycin alone. It is to be noted that there has been a slightly higher total incidence of abnormalities on combined therapy (40.9 per cent) as compared with SM alone (32 per cent). Thirty-seven per cent (37.1 per cent) on combined therapy had suffered some impairment of hearing alone as compared with 12 per cent on streptomycin. However, only 2.85 per cent of the patients on the present study showed vestibular damage alone as compared with the 12 per cent on the streptomycin series, and only 0.95 per cent had both audio and vestibular damage as compared to 8 per cent on the streptomycin alone series. These findings would indicate that there is a total overall increase in hearing damage on streptoduocin therapy when compared with streptomycin therapy alone. However, there is a significant lessening of vestibular damage on combined therapy. These factors are in line with what would be predicted from our knowledge of the drugs and would confirm the fact that there is greater risk to hearing from dihydrostreptomycin with lessened vestibular damage,

TABLE III
COMPARISON OF OTOTOXICITY OF ABNORMAL FINDINGS AFTER
SM-DHSM THERAPY AND SM THERAPY ALONE IN COMPARABLE SERIES

Type of Dysfunction	SM-DHSM Per Cent	SM Alone Per Cent*
Audiographic Alone	37.10	12
Vestibular Alone	2.85	12
Audio and Vestib	0.95	8
TOTAL OF SERIES	40.90	32

*Figures on SM alone from Cline, Houseworth and Pitts: Arch. Otolaryngol., 59:100, 1954.

and that the converse is true of streptomycin alone. It would seem to us that combined therapy has little to recommend it over streptomycin alone since the decrease in vestibular damage, which is easily compensated for by the individual, is more than offset by the increase in auditory damage due to the addition of dihydrostreptomycin. Actually the clinical impairment on either intermittent streptomycin or streptoduocin has been much less than might be inferred from the laboratory findings.

CONCLUSIONS

One hundred five patients with pulmonary tuberculosis were treated from six to eight months with streptoduocin, a combination of equal parts of streptomycin and dihydrostreptomycin, two grams every third day, for the first six months and one gram every third day thereafter. Audiograms and ice water vestibular studies were done and the results compared with those of a series of 100 patients who received streptomycin alone. Of the patients in the present series, 66.7 per cent had some initial hearing loss as measured by the audiogram. The results in this series have been analyzed as a separate group. It is concluded: (1) The overall incidence of ototoxicity is higher with streptoduocin than with streptomycin alone. (2) The incidence of audiographic abnormalities is in the neighborhood of three times that of streptomycin alone. The incidence of vestibular damage with combined therapy is about one-fifth that with streptomycin alone. (3) The above findings are to be expected from the nature of the drugs used and the increase in hearing loss from combined therapy more than offsets any advantages due to lessened vestibular damage. (4) Patients with initial hearing loss in the high frequencies are more prone to further loss as a result of streptoduocin. (5) Despite the large number who showed audiographic changes, only 3.8 per cent of the total series developed clinical loss of hearing. (6) In our experience, streptomycin-dihydrostreptomycin combinations seem to offer no advantage over streptomycin alone from the standpoint of ototoxicity when used in the long term treatment of tuberculosis.

CONCLUSIONES

Durante seis a ocho meses se trataron 105 enfermos de tuberculosis pulmonar usando estreptoduocina, una combinación de partes iguales de estreptomicina y dihidroestreptomicina, dos gramos cada tercer día por los primeros seis meses y un gramo cada tercer día a partir de entonces. Se hicieron estudios con audiogramas y con pruebas de agua helada para función vestibular y los resultados se compararon con los de 100 enfermos que usaron estreptomicina sola.

Según los audiogramas, 66.7 por ciento de los enfermos de la serie, tenían alguna pérdida auditiva inicial.

Los resultados de estos grupos se han analizado separadamente.

Se concluye: (1) En general la incidencia de oto-toxicidad es más mayor con la estreptoduocina que con la estreptomicina sola. (2) La incidencia de anomalías audiográficas está en las cercanías de tres veces la de la estreptomicina sola. La incidencia de daño vestibular con el tratamiento

combinado, es como un quinto en comparación con la de la estreptomycin sola. (3) Los hallazgos antes dichos son de esperarse por la naturaleza de las drogas usadas y por el aumento de la sordera debida a la terapia combinada, la que supera cualquier ventaja debida a menor daño vestibular. (4) Los enfermos con algo de deficiencia auditiva antes del uso de las drogas son más propensos a mayor daño por la estreptoduocina. (5) A pesar del gran número que mostraron cambios audiográficos, sólo 3.8 por ciento del total de las series presentaron pérdida clínica del oído. (6) Según nuestra experiencia, las combinaciones de estreptomycin dihidroestreptomycin, no ofrecen ventaja sobre la estreptomycin sola desde el punto de vista de la toxicidad auditiva, cuando se usan en tratamientos de tuberculosis a largo plazo.

SCHLUSSFOLGERUNGEN

Es wurden 105 Kranke mit Lungentuberkulose 6-8 Monate mit Streptoduocyn behandelt, einer Kombination von gleichen Teilen von Streptomycin und Dihydrostreptomycin, 2 Gramm jeden dritten Tag während der ersten 6 Monate und danach 1 Gramm jeden dritten Tag. Es wurden Audiogramme und Eiswasserprüfungen des Vestibular-Apparates vorgenommen und die Ergebnisse verglichen mit denjenigen einer Serie von 100 Patienten, die nur Streptomycin erhielten. 66,7% der Patienten der vorliegenden Untersuchungsreihe hatten einige anfängliche Hörverluste, wie die Messung durch das Audiogramm ergab. Die Ergebnisse dieser Untersuchungsreihe sind als getrennte Gruppe ausgewertet worden. Es wird der Schluss gezogen, dass (1) das Gesamtvorkommen otologischer Schädigungen höher ist mit Streptoduocin als mit Streptomycin allein. (2) Das Vorkommen von Audiographischen Abweichungen liegt etwa bei dem dreifachen Wert desjenigen von Streptomycin allein. Das Vorkommen einer Vestibularis-Schädigung im Rahmen der kombinierten Therapie beträgt ungefähr 1 Fünftel desjenigen mit Streptomycin allein. (3) Die obigen Befunde sind zu erwarten aus Natur der verwandten Arzneimittel, und der Anstieg des Hörverlustes durch die kombinierte Therapie schafft mehr als einen Ausgleich gegenüber den durch die verringerte Vestibularis-Schädigung gegebenen Vorteile. (4) Kranke mit initialem Hörverlust in den hohen Frequenzen sind empfänglicher gegen weitere Herabsetzungen infolge des Streptoduocins. (5) Trotz der grossen Zahl, die audiographische Veränderungen aufwiesen, entwickelten sich nur bei 3,8% aller Untersuchungsreihen klinisch ein Hörverlust. (6) Nach unseren Erfahrungen scheinen Kombinationen von Streptomycin und Dihydrostreptomycin keine Vorteile zu bieten im Vergleich zu Streptomycin allein vom Standpunkt otologischer Toxizität bei Verwendung über lange Zeiträume in der Tuberkulose-Behandlung.

REFERENCES

- 1 Cline, H. L., Houseworth, J. H. and Pitts, F. W.: "Ototoxicity from Intermittent Streptomycin Sulfate Therapy of Pulmonary Tuberculosis," *AMA Arch. Otolaryngology*, 59:100, 1954.
- 2 Shubin, H., Heiken, C. A., Glaskin, A., Pennes, E., Chakravarty, S. and Rutberg, F.: "A Study of Neurotoxicity of Streptoduocin on Tuberculous Patients," *Dis. Chest*, 28:447, 1955.

Massive Spontaneous Mediastinal Emphysema

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Mediastinal emphysema of known etiology was first described in 1826 by Laennec. It was a subject that attracted little attention and a hundred years were to pass before the profession became fully aware of its existence and its relative frequency in diseases and injuries of the chest.

It was not until 1930 when Jessup published a comprehensive paper that interest was stimulated; and the literature thereafter became more prolific. Joannides and Tsoulos in the same year, and Machlin (1937) presented the results of a series of experiments on cats and dogs which explained unequivocally the mechanism of production of this condition and the course which the air took from its confines in the alveoli to the mediastinal planes.

All these workers, clinicians or physiologists were concerned only with mediastinal emphysema due to a known cause. Jessup enumerates 15 of these causes. That it might occur *spontaneously* with no known etiology, no predisposing factors and in a perfectly normal individual was quite unsuspected.

It was not until 1939 when the late Louis Hamman published his classical series that this syndrome was recognised. Subsequently McGuire and Bean (1939), Moray and Susman (1939) and Lintz (1943) produced further cases but during the 10 years from 1933 when Hamman first started collecting his cases, only 13 patients are described in the literature. It is obvious from these figures that mediastinal emphysema occurring without any precipitating factor in a normal individual is rare.

It is the purpose of this paper to review briefly the available literature on this subject and describe its signs and symptoms and also the accepted mechanism of its production.

One case of massive spontaneous mediastinal emphysema is recorded which is unique in that it occurred in the post-operative phase following a simple anaesthetic. It was of dramatic onset and equalled or surpassed in its magnitude that of the previously recorded cases.

Signs and Symptoms

Classically the condition occurs in a normal, healthy individual who is not undergoing any exertion at the time of onset. The signs and symptoms are unheralded and dramatic. They appear suddenly, last for a variable period up to 18 days and begin to disappear with almost equal suddenness. The patient returns rapidly to normal health and is left none the worse for his experience. Unless the medical attendant is aware of this condition he is left a little bewildered by the rapid chain of events and certainly a little apprehensive on his patient's account.

If pneumothorax develops as happened in two of Hamman's cases the diagnosis is simplified, but in many cases this does not occur and x-ray examination of both lungs may show little demonstrable change. Jessup describes increased vascular markings in one case but here there was a

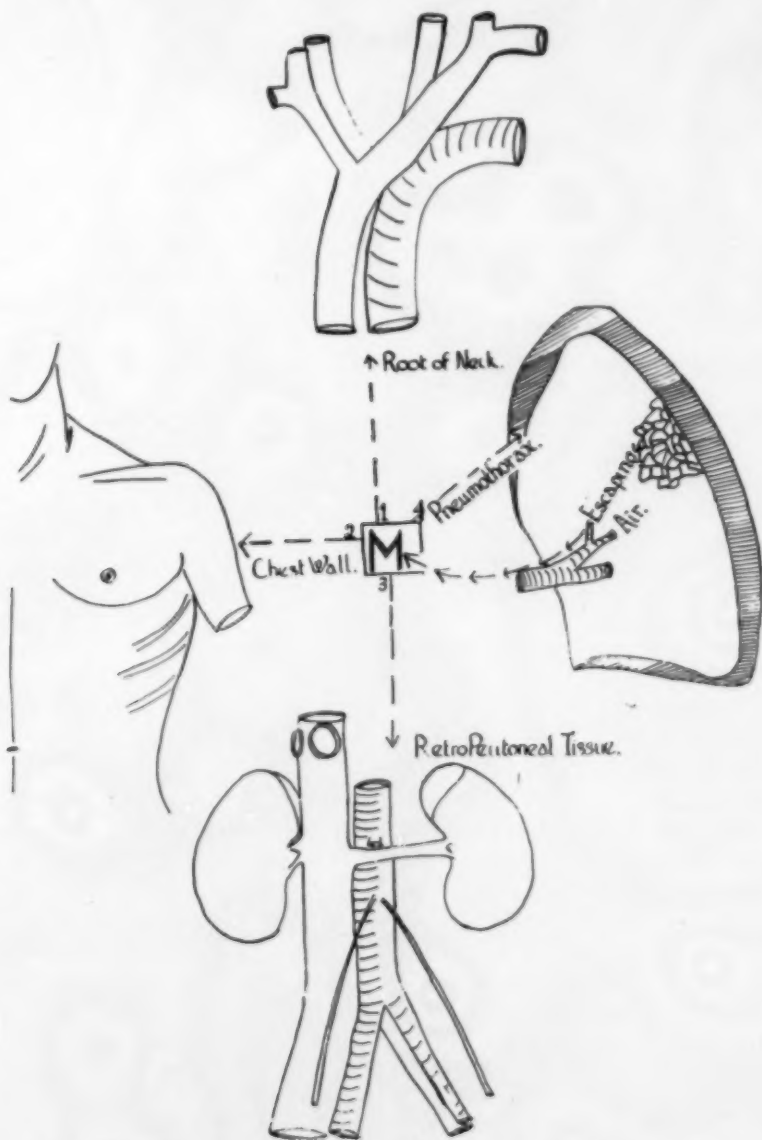


FIGURE 1: Diagrammatic representation of the paths taken by air escaping from ruptured alveoli.

complete pneumothorax on one side and a decided mediastinal shift. The x-ray picture, could therefore, be regarded as due to venous engorgement and not due to any primary change taking place in the vicinity of the larger vessels due to infiltration of air around them. Radiological investigation of the mediastinum however, shows clear and unmistakable signs of the presence of air and this will establish the diagnosis unequivocally. A sharp and distinct line may be seen running parallel to the borders of the heart, more marked on the right but also visible in the upper part of the left side. Neither Hamman's radiographs nor those of the case under review (Fig. 2) show any marking over the left ventricle. It may be that the sharp convex border occludes the shadow. These lines are produced by air collecting between the heart and the great vessels medially and the mediastinal pleura laterally. If air is present in the soft tissue of the neck this will show unmistakably on the x-ray film and will only serve to confirm the most outstanding physical sign—that of surgical emphysema.

The presence of air in the soft tissues at the base of the neck or over the chest wall as described by many observers and noted by the writer, is the most outstanding physical sign and one which provides the diagnosis on first inspection.

The absence of shock or any systemic disturbance is an outstanding feature of this condition. There is, however, a tendency for the temperature to be raised in the initial stages and the leukocyte count may be considerably above normal. Readings of 19,000 have been recorded (Lintz, 1943). In no case, however, has there been clinical evidence of infective process. It is reasonable to think that along with escaping air there is also present some secretion from the bronchial tree but the clear absence of any evidence of mediastinitis in any recorded cases would tend to exclude an infective element as the exciting cause. The pyrexia and the leukocytosis occur rapidly, being present only an hour or two after onset; this would further support this contention.

In the author's case a swinging temperature was present for many days but in spite of a rather empirical exhibition of several wide spectrum antibiotics, it showed no response and slowly settled of its own accord.

Mechanism of Production

All these clinical observations indicate clearly that the pulmonary alveoli of an otherwise normal individual may rupture spontaneously and give rise to a transitory escape of air.

Of the patients who have been examined none has shown evidence of old standing pulmonary disease and it is assumed that the alveolar walls for some reason suddenly give way. It is not known whether the affected alveoli are scattered or contiguous because the resulting areas of atelectasis (if, indeed, such occurs) are too small to show on radiological examination and have not been detected clinically.

The work of Machlin (1937 and 1939), Joannides and Tsoulos (1930) and the earlier experiments of Kelman (1919) have shown that forceful

rupture of the alveoli by the introduction into the trachea of compressed air will lead to mediastinal emphysema. It is reasonable to assume that the pathways they have discovered are those taken by escaping air in the condition under review. The fact that the alveoli in the experimental animal were ruptured mechanically and these ruptured spontaneously does not alter the subsequent chain of events.

Machlin has shown that the air travels towards the mediastinum along the sheaths of the arteries producing thereby a continuous pathway from the peripheral alveoli to the hilum of the lung. The interstitial tissue investing the bronchi does not contain air. d'Abreu (1953), on the other hand, describing the mechanism of mediastinal emphysema following forceful distention of the lungs against a closed glottis, claims that air passes centrally via the loose fascial planes around the bronchioles and bronchi.

Machlin has shown that pneumothorax which may occur is secondary to the collection of air in the mediastinum. He supports this by citing two oft-recurring postmortem findings in experimental animals, namely, that there is no tear demonstrable in the visceral pleura and that a tear definitely can be shown in the mediastinal pleura. By experiment he has shown that by inducing pneumothorax in cats mediastinal emphysema does not follow. It is possible, however, to produce pneumothorax by introducing air into the mediastinum under pressure.

Once air has reached the mediastinum it may pass up into the neck around the great vessels or down through the diaphragm into the retro-

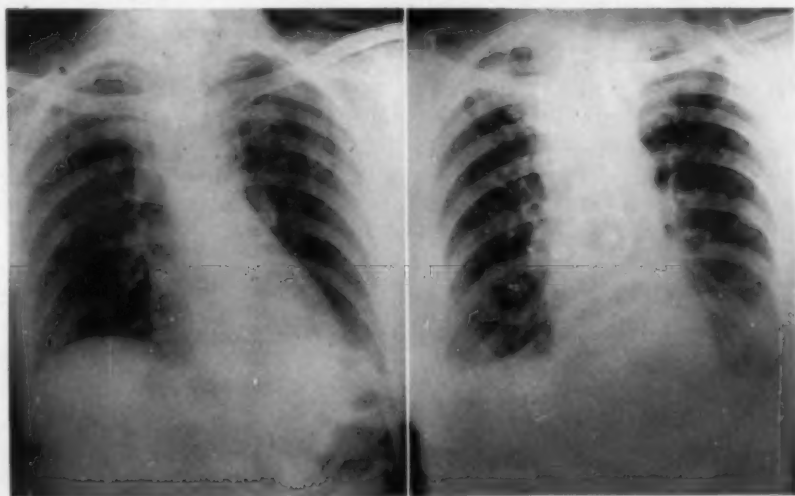


FIGURE 2

FIGURE 3

Figure 2: X-ray film of author's case showing gross mediastinal emphysema with marked outline on the right side of the heart and to a lesser extent, on the left. Air is present in the tissues at the root of the neck.—*Figure 3:* The same as in Figure 2. Film taken three days afterward. The amount of air on the right side of the heart is considerably diminished.

peritoneal tissues. Increasing pressure of air in the mediastinum produces symptoms of substernal pain, but the pressure effects on the great vessels and right sided heart failure, which have been observed following traumatic mediastinal emphysema have not been observed in the spontaneous variety.

Case Report

Mrs. D., a thin spare little woman of 52, had a radionecrosis of the left cheek. She had a rodent ulcer in this area many years ago and following its repeated irradiation the soft tissues atrophied and the skin broke down.

It was planned to raise an arm pedicle and transfer it to her face. Her first operation for raising the pedicle was carried out on August 1, 1954. The anaesthetic agents were pentothal, nitrous oxide, oxygen and trilene delivered by a Number 8 endotracheal tube. During the anaesthetic and in the post-operative phase, there was no untoward symptom and on August 31, 1954 she had a further operation and an identical anaesthetic. One month later she was re-admitted for the penultimate surgical procedure. At this stage the pedicle was detached from her arm and inset into her cheek.

The anaesthetic agents used were similar and the operation was straightforward and lasted less than an hour. After her return to the ward she made a quiet and peaceful return to consciousness. Her recovery was characterized by complete absence of coughing and vomiting as indeed one would expect considering the anaesthetic agents and the mode of their administration. She was seen at about six hours after return to the ward and her condition was quite normal.

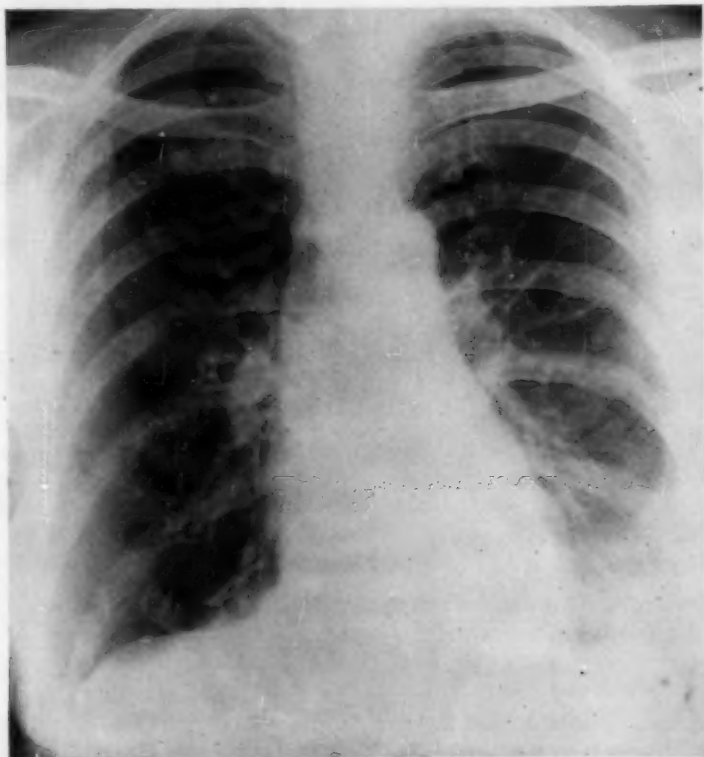


FIGURE 4: The same case as in the preceding two figures, showing return to normal.

At midnight the night nurse straightened her pillows and gave her a one-third gr. Omnopon. Towards morning she wrote in her report book that Mrs. D. had passed a quiet night and was comfortable. Between nine and ten o'clock the following morning, however, a dramatic change occurred in her condition. When seen at 10 o'clock she was propped up in bed looking apprehensive and flushed. She complained of severe pain beneath the sternum which radiated to the left shoulder. She had acute dysphagia and was unable to swallow anything other than a few sips of water. Her temperature was 102° F. and her pulse rate 120.

The most striking physical sign was a gross surgical emphysema which was present at the root of the neck on the left side and extended down over the chest wall to the level of the second rib. A few hours later this had increased considerably in size and there were crepitations as far up as the level of the hyoid and extending across the midline of the neck. On percussion and auscultation no abnormal sounds were forthcoming and there was no evidence of a pneumothorax.

An x-ray film of her chest taken at this time (Fig. 2) showed gross mediastinal emphysema with bubbles of air in the soft tissue but no evidence of pneumothorax and full expansion of the lung. At this stage she was seen by a chest surgeon who confirmed the diagnosis of spontaneous mediastinal emphysema.

Within 24 hours her distress had considerably improved and three days later she began to get out of bed. The surgical emphysema was slow to disappear but by the end of seven days was considerably reduced. It was not until the elapse of a fortnight, however, that all crepitations disappeared. The temperature fell from 102° to 100° by the third day but tended to swing from 99° to 101° at times and it was not until the 19th day that it remained normal for 48 hours. Thence forward she was afebrile. A generous exhibition of antibiotics failed apparently to have any effect on the temperature and after five days they were withdrawn. On the 19th day she went home. She has been seen as an out-patient from time to time. Her chest shows no signs of any abnormality and she has almost forgotten the whole incident.

Subsequently, a full examination including a bronchogram and barium swallow and detailed history failed to show any previous chest lesion. The rapid disappearance of dysphagia and the absence of blood stained expectoration excluded the possibility of trauma occurring to the pharynx by the endotracheal tube.

Figure 3 taken on the fourth day shows considerable difference in mediastinal air and the distinct shadow on the right side of the heart is less obvious. The air had apparently burrowed its way upwards into the neck thereby relieving pressure in the mediastinum. Figure 4 taken three months after the onset shows a complete return to normal.

Spontaneous mediastinal emphysema, is a rare condition and all possible causes of emphysema must be ruled out before the diagnosis can be substantiated. In this particular case it is important to exclude traumatic emphysema due either to instrumentation during induction of the anaesthetic or to forced inflation of the lungs with consequent rupture of alveoli. Ozinsky and Bull (1955) have published a case of mediastinal emphysema occurring during anaesthesia caused by overinflation of the lungs but the emphysema became apparent at once as would be expected, whereas in the author's case a latent period of at least 12 hours occurred before onset of signs.

Acknowledgement: I wish to express my thanks to Dr. J. McN. Inglis for his encouragement and helpful advice. Mr. D. Whistance, clinical photographer to the Plastic Unit, is responsible for the photographs and I am very grateful to him.

SUMMARY

Interstitial emphysema of the lungs and mediastinal emphysema have been recognised and observed for many years. Such conditions, however, have always been attributed to causative factors such as trauma, forced expiration against a closed glottis and others.

Their spontaneous appearance had never been suspected until the original work of Louis Hamman in 1938. He published seven cases in which this condition occurred in otherwise healthy individuals without evident pre-

disposing factors and without trauma, be it by external agency or auto-induced by the patient's own expiration.

Hamman established clearly that in the normal healthy person it was possible for the alveoli to rupture and for air to escape and find its way among the interstitial tissue of the lungs to the mediastinum and thence up into the neck, down into the retroperitoneal tissue and also into the pleura producing pneumothorax.

The experimental work of Macklin showed clearly the pathway of the air to be as Hamman describes and he stresses that pneumothorax, when it occurs, is secondary to mediastinal emphysema, and that the reverse does not occur.

A case is presented of mediastinal emphysema occurring in a normal woman some 12 hours after an uneventful general anaesthetic for a plastic operation. Such a case has not appeared before in the literature. The clinical findings and the progress of the disease compare closely with some of Hamman's cases and the fairly rapid progress to complete normality is as he describes it.

RESUMEN

El enfisema intersticial de los pulmones y el enfisema mediastínico se han reconocido y observado por muchos años. Tales afecciones sin embargo se han atribuido a factores causales como el trauma, expiración forzada con glotis cerrada y otros. Su aparición espontánea no ha sido sospechada hasta que se publicó el trabajo de Louis Hamman en 1938. Este autor publicó siete casos en los que esta afección ocurrió en personas sanas por otros conceptos y sin evidentes factores de predisposición, sin trauma externo o producido por el propio enfermo mediante expiración forzada.

Hamman estableció con claridad que en la persona sana es posible que los alveolos se rompan y que el aire escape pasando entre el tejido intersticial de los pulmones al retroperitoneal y también a la pleura produciendo neumotórax.

El trabajo experimental de Macklin mostró claramente que el camino recorrido por el aire fué el descrito por Hamman y recalca que el neumotórax, cuando ocurre, es secundario al enfisema mediastinal pero que lo inverso no ocurre.

Se presenta un caso de enfisema mediastinal que ocurrió en una mujer como doce horas después de una anestesia general sin incidentes, para una operación plástica. Caso semejante no se ha publicado. Los hallazgos clínicos y la evolución de la enfermedad se parecen mucho a los de Hamman y la evolución rápida hacia lo normal fué como él la describe.

RESUME

L'emphysème interstitiel des poumons et l'emphysème médiastinal ont été décrits et observés depuis longtemps. Ces états, toutefois, ont toujours été considérés comme étant dus à un traumatisme, à une expiration forcée avec une glotte étroite, etc.

Leur apparition spontanée n'avait jamais été suspectée avant le travail original publié par Louis Hamman en 1938. Cet auteur rapporta plusieurs

cas où ces manifestations atteignent des individus par ailleurs sains, sans facteur prédisposant évident, et sans traumatisme, soit d'origine externe, soit du seul fait de l'expiration du malade.

Hamman établit clairement que chez une personne normalement saine, il était possible que les alvéoles se rompent et que l'air s'en échappe. Il peut alors cheminer à travers le tissu interstitiel des poumons jusqu'au médiastin et de là remonter vers le cou, descendre dans le tissu rétro-péritonéal, et atteindre également la plèvre et réaliser un pneumothorax.

Le travail expérimental de Macklin montra clairement que le chemin parcouru par l'air était bien celui qu'avait décrit Hamman. Il fit la preuve que le pneumothorax est alors secondaire à l'emphysème médiastinal et que le processus inverse ne peut se produire.

L'auteur présente un cas d'emphysème médiastinal survenu chez une femme en bonne santé environ douze heures après une anesthésie générale inopportune pour une intervention esthétique. Un cas de cette nature n'a jamais été rapporté jusqu'à présent dans la littérature. Les constatations cliniques et l'évolution de l'affection sont étroitement comparables à certains cas d'Hamman. L'évolution favorable et rapide avec réexpansion complète sont conformes à la description de cet auteur.

ZUSAMMENFASSUNG

Das interstitielle Lungenemphysem und das mediastinale Emphysem sind seit vielen Jahren erkannt und beobachtet worden. Solche Zustände sind jedoch immer solchen ursächlichen Faktoren zugeschrieben worden wie Trauma, forciertem Expiration gegen eine geschlossenen Glottis und anderer.

Ihr spontanes Auftreten ist niemals angenommen worden bis zu der Originalarbeit von Louis Hamman 1938. Er veröffentlichte 7 Fälle, bei denen dieser Zustand vorkam bei sonst gesunden Individuen ohne augenfällige prädisponierende Faktoren und ohne Trauma, sei es durch äussere Einwirkung, oder sei es selbst verursacht durch des Kranken eigene Expiration.

Hamman bewies klar, dass es beim normalen gesunden Menschen den Alveolen möglich war, zu rupturieren, und dass es der Luft möglich war, zu entweichen und ihren Weg zu finden entlang dem interstitiellen Lungengewebe bis zum Mediastinum und von daher aufwärts zum Hals, abwärts in das retroperitoneale Gewebe und auch in die Pleura mit Ausbildung eines Pneumothorax.

Die experimentelle Arbeit von Macklin hat klar ergeben, dass der Weg der Luft so verläuft wie ihn Hamman beschreibt, und er betont, dass, wenn ein Pneumothorax vorkommt, er die Folge eines mediastinalen Emphysems ist, und dass das Umgekehrte nicht vorkommt.

Ein Fall von mediastinalen Emphysem wird beschrieben, der bei einer normalen Frau auftrat etwa 12 Stunden nach einer ohne Zwischenfall vorgenommenen Allgemein-Narkose wegen einer plastischen Operation. Ein solcher Fall ist bisher in der Literatur nicht erschienen. Die klinischen Befunde und der Verlauf der Erkrankung stimmen weitgehend mit einigen

der Hamman'schen Fälle überein und die ziemlich rasche Entwicklung zu vollständig normalen Befund ist die gleiche wie er sie beschreibt.

BIBLIOGRAPHY

- d'Abreu, A. L.: *A Practice of Thoracic Surgery*, Arnold, London, 1953.
- Hamman, L.: "Spontaneous Mediastinal Emphysema," *Bull. John Hopkins Hosp.*, 64:1, 1939.
- Jessup, P. M.: "Mediastinal Emphysema," *Arch. Surg.*, 23:760, 1931.
- Joannides, M. and Tsoulos, G. D.: "Aetiology of Interstitial Mediastinal Emphysema," *Arch. Surg.*, 21:333, 1930.
- Kelman, S. R.: "Experimental Emphysema," *Arch. Int. Med.*, 24:332, 1919.
- Laennec, R. T. H.: "Traite de l'Auscultation et des Maladies des Poumons et du Cœur," 2 Ed. 2v., 36:729, 1826.
- Lintz, R. M.: "Spontaneous Mediastinal Emphysema," *Arch. Int. Med.*, 71:256, 1943.
- McGuire, J. and Bean, W. B.: "Spontaneous Interstitial Emphysema of the Lungs," *Am. J. Med. Sciences*, 197:502, 1939.
- Macklin, C. C.: "Pneumothorax with Massive Collapse from Experimental Local Over Inflation of Lung Substance," *Canad. M. J.*, 36:414, 1937.
- Macklin, C. C.: "Transport of Air Along Sheaths of Pneumonic Blood Vessels from Alveoli to Mediastinum; Clinical Implications," *Arch. Int. Med.*, 64:913, 1939.
- Moray, T. B. and Susman, M.: "Spontaneous Mediastinal Emphysema," *Radiology*, 32:19, 1939.
- Ozinsky, J. and Bull, A. B.: *Brit. Med. Jour.*, 4911, 1955.

Cord-Forming Property, Lethality and Pathogenicity of Mycobacteria*

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Introduction

The genus *Mycobacterium* include a great number of non-pathogenic organisms as well as some pathogenic species which cause tuberculosis in mammals, birds and cold-blooded animals.

The differentiation between pathogenic strains and non-pathogenic ones is based on the lethal properties of the bacilli for experimental animals, particularly the guinea pig. A strain is not considered pathogenic when it does not kill the animal, even when it causes considerable morbid lesions. This simple criterion of pathogenicity makes it possible to differentiate the lethal strains from non-pathogenic or saprophytic *Mycobacteria* but it does not enable to recognize the non-lethal strains of reduced or intermediate pathogenicity. It was accepted by inference, that these latter strains are not of importance in human pathology. Interest in these strains was aroused recently when it was found that the cultures of acid-fast bacilli from patients under streptomycin or isoniazid therapy are often not lethal to guinea pigs.³⁻⁶ The discovery that these strains although not lethal to guinea pigs are lethal to mice (Karlson and Ikemi, 1952), that the BCG strain, which was thoroughly studied and recognized as not lethal to animals and humans, has killed two men (Meyer and Jensen, 1954; Oeding and co-workers, 1954) further complicated the pathogenicity problem of *Mycobacteria*. The amount of lesions in animals cannot differentiate the strains of reduced pathogenicity. Other suggested procedures, such as the inoculation of the chorioallantoic membrane of the developing chick embryo, have also failed to differentiate *Mycobacteria* of reduced pathogenicity (Fite and Olson, 1944).

In vitro methods would be of considerable advantage over animal inoculation in pathogenicity studies. They would save time and money and might eventually demonstrate the pathogenicity of *Mycobacteria* not revealed by animal inoculations. Middlebrook, Dubos and Pierce, 1947, recognized the "cord formation" in *Mycobacteria* as an indicator of pathogenicity. These findings were confirmed by Roth, 1949, Bloch, 1950, and others. Doubts about the significance of "cord formation" as an indicator of pathogenicity were aroused when this kind of formation was found in seemingly non-lethal or even saprophytic strains of *Mycobacteria*, (Richmond and Cummings, 1950) and when photographs of BCG cords were published by Kölbel, 1951, Engbaek, 1952. These findings forced Dubos, 1950, to pose the question of how to reconcile the presence of cords and the absence of pathogenicity in *Mycobacteria*.

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The above considerations led us to study cord formation as a means of differentiating degrees of pathogenicity of *Mycobacteria*.

Method

A previous study by one of us (E. D.) has shown that a liquid medium of the following composition stimulates cord formation:

Basal medium:

KH ₂ PO ₄	1.0 gram	Peptone, Bacto	5.0 gram
Na ₂ HPO ₄ ·12H ₂ O	5.0 gram	Sodium citrate	1.0 gram
MgSO ₄ ·7H ₂ O	0.2 gram	Ferris ammon. citrate	0.02 gram
Asparagine	2.0 gram	Dist. water	1000.0 gram

The basal medium is distributed in flasks and sterilized in an autoclave.

Glycerinated bovine serum

Bovine serum	50 ml.	Glycerol, sterile	15.0 ml.
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Blood from the carotid artery of a freshly killed ox is aseptically collected in a sterile, paraffinated 1 liter Erlenmeyer flask. (Dissolve 1-2 grams of hard paraffin in ether, rinse the flask with the solution, discard the rest. The paraffinated flask may be used some days later, when the ether has evaporated). On the second and third day the serum is aseptically collected from the clotted blood, centrifuged, divided into 50 ml. lots in 250 ml. flasks, heated for one hour in a water bath at 56° C. After cooling, 15 ml. of sterile glycerol is added to each 50 ml. of the heated serum. After a week or two a sterility test of the mixture is made. Conserved in an ice-box, it is good for months.

To make up the culture, 10 ml. of glycerinated serum are added to 100 ml. of basal medium. The medium is aseptically distributed into big tubes (3 x 15 cm.), 6-8 ml. per tube. The inoculated tubes are incubated at 37° C. for two weeks, then 0.2-0.3 ml. of the sediment is taken out with an ordinary pipette, spread over a slide, dried and stained according to the Ziehl-Neelsen technique, with the exception that the decolorized slide is not counterstained with methylene blue but immersed for 15 seconds in a half saturated aqueous solution of picric acid. On the uniformly yellow background the red serpentine cords of pathogenic *Mycobacteria* can be seen with the low power lens of a microscope.

The addition of Tween 80 to the medium is harmful for the purpose of testing cord formation. Tween 80 is an agent which opposes cord formation, producing dispersed growth of *Mycobacteria*.

Material

An agreement was reached between the laboratory of the Minnesota State Department of Health in Minneapolis and the Tuberculosis Research Laboratory of the Anoka State Hospital in Anoka (referred to as "Anoka laboratory"), that the Anoka laboratory was to receive cultures of *Mycobacteria* cultivated in the laboratory of the Minnesota State Department of Health from the pathologic material and tested for pathogenicity by

guinea pig inoculations for the purpose of testing for cord formation in liquid medium at the Anoka laboratory.

The Anoka laboratory received 249 strains of *Mycobacteria* from the laboratory of the Minnesota State Department of Health, four strains were in duplicate. The 245 remaining strains were tested for cord formation. To avoid the possibility of the results of guinea pig inoculation data influencing the results of the cord testing experiments at the Anoka laboratory, the results of the guinea pig inoculations at the laboratory of the Minnesota State Department of Health were given to the Anoka laboratory after the work of cord testing at the Anoka laboratory had been concluded. (Except 40 strains which were inoculated into guinea pigs at the Anoka laboratory. See later).

From the Minneapolis strains, 192 were marked with the number and the name of the patient, we designated these strains with an "M"; 40 strains besides the number and the patient's name bore the mark "C"; eight strains had the mark "N," and five strains the mark "R."

Results

The Minneapolis M strains were isolated from tuberculous patients; they all produced typical cords and were classified as lethal. These strains caused tuberculosis in guinea pigs. C strains produced yellow pigment and abundant early growth with formation of heavy pellicles on the surface of the medium. The growth was dispersed, no cord formation was detected. The C strains were classified as saprophytic. As it was discovered later, the C strains, on the ground of their obvious saprophytic cultural properties, had not been inoculated into guinea pigs. To verify the cultivation results, these 40 strains were inoculated into guinea pigs at the Anoka laboratory. These strains did not cause death or morbid lesions in guinea pigs.

In both the M and C strains, representing 94.3 per cent of the State

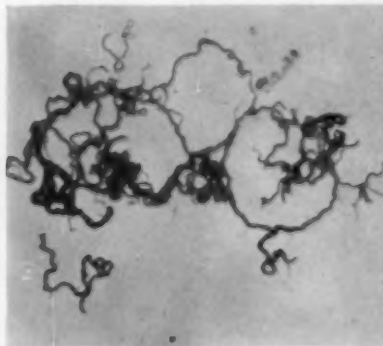


FIGURE 1

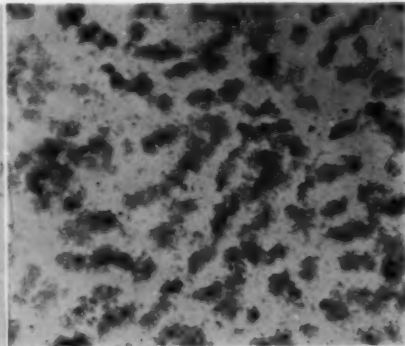


FIGURE 2

Figure 1: True cords of the lethal tubercle bacilli (Magnification 126X).—Figure 2: False cords of the non-pathogenic tubercle bacilli (Magnification 126X).

Board of Health material, full agreement between cord formation of the strains and the pathogenicity tests in guinea pigs was reached.

The N stains, as we were later informed, were isolated at the laboratory of the Mayo Clinic, Rochester, from the sputa, gastric washings and urine of patients. The growth of these strains was relatively slow, without pigment formation, and resembled the growth of lethal strains. These strains were not lethal to guinea pigs and accordingly have been classified as non-pathogenic. The N strains showed in liquid medium some rudimentary cord formation and one of them (N-5) on the ground of its cord formation, was classified as pathogenic. This N-5 strain in guinea pigs, inoculated subcutaneously with 0.1 ml. of the liquid culture, produced considerable caseation of the lymphatic nodes but the animals were alive after three months of observation. The N strains were recognized as non-lethal, although their origin from the lethal strains was presumed. Strains of this group were most difficult to classify. It was difficult to determine the stage at which the structure of the cords indicate the loss of lethality, when some pathogenicity of the strain still remains.

The R strains uniformly produced cords and were classified as lethal. These strains were isolated from the sputa and gastric washings of patients with tuberculosis, and all were resistant to 10 micrograms of isoniazid. Two of these strains were lethal when inoculated subcutaneously into guinea pigs; the three others were not lethal to guinea pigs. These strains, inoculated intravenously into mice, were lethal to those animals (Karlson).

The true, fully developed cord of lethal *Mycobacterium* is a tight formation of parallel bacilli, produced by sliding growth of them. Even the oil immersion objective of a microscope can scarcely reveal separate bacilli in the cord. With the decrease in pathogenicity the structure of the cord becomes more and more loose, and in saprophytic strains the formation

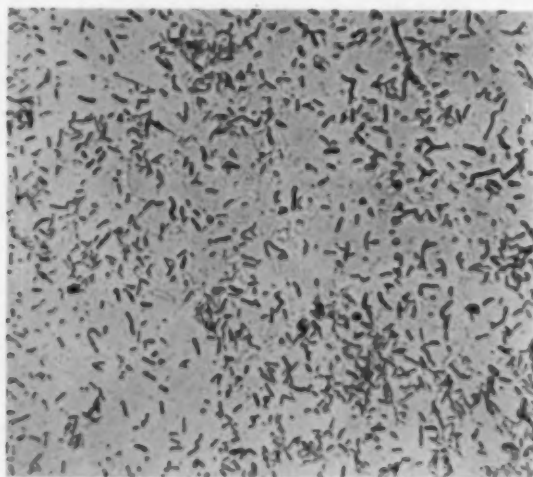


FIGURE 3: Dispersed growth of the saprophytic acid-fast bacilli (Magnification 480X).

disappears, the growth being dispersed or assuming the form of loose heaps. Generally, when the oil immersion objective recognizes in the axis of a grown-up cord well separated bacilli, the lethality of the strain is lost.

No one actually knows the role of the strains of reduced pathogenicity in human pathology, but the harmlessness of these strains must be doubted.

The results of pathogenicity and lethality tests of our strains are summarized in Table I.

Discussion

As our experiments revealed all strains of tubercle bacilli lethal to guinea pigs as well the strains of reduced pathogenicity, which do not kill guinea pigs following the usual route of inoculation, produce well-formed cords. Between the strains of full pathogenicity (lethal) and the complete absence of pathogenicity (saprophytic strains) is the spectrum of variable pathogenicity. Guinea pig inoculation can differentiate between lethal strains and saprophytic ones, although there is no need to inoculate animals with these strains. The liquid medium recognizes these strains with the same accuracy as the animal inoculation. The strains of reduced pathogenicity on the ground of guinea pig inoculation would be differentiated by a bacteriologist as "non-pathogenic"; the pathologist finds in the animals, inoculated with these strains, considerable morbid lesions. The variable pathogenicity of the intermediate strains is reflected in the structure of the cords. The strains derived from lethal strains, such as BCG, H37Ra, our R strains, developed in patients treated with antibiotics or chemotherapeutics, or sometimes of unknown origin, and producing true cords in liquid medium, must be recognized as pathogenic. The lethality of *Mycobacterium* to guinea pig is easily lost, the cord formation is conserved due to the rest-pathogenicity remaining in the bacilli.

CONCLUSIONS

The pathogenicity of 245 strains of *Mycobacteria* was tested by means of guinea pig inoculations; in another laboratory the same cultures were

TABLE I
PATHOGENICITY AND LETHALITY TESTS OF
245 STRAINS OF MYCOBACTERIA

Cord formation (Anoka Laboratory)		Guinea pig inoculation. (Laboratory of the Minnesota State Department of Health)	
	Cultures		Cultures
M strains, cords present	192	Tuberculosis in guinea pigs	192
C strains, cords absent	40	No tuberculosis in guinea pigs	40*
N strains, cords absent	7	No tuberculosis in guinea pigs	7
N strains, cords present	1	No lethal tuberculosis	1
R strains, cords present	5	(Tuberculosis in guinea pigs Tuberculosis in mice)	2 3

*Inoculated into guinea pigs at the Anoka Laboratory.

tested for their cord-forming ability in the liquid medium.

Both methods, the guinea pig inoculation and the cord-forming ability, recognized 192 lethal and 40 saprophytic strains with equal efficiency.

The two above mentioned groups of *Mycobacteria* represented 94.3 per cent of the strains tested.

The remaining material consisted of eight N strains showing rudiment of cord formation. These strains were not lethal to guinea pigs but caused considerable morbid lesions in them. The origin of these strains from the lethal ones was presumed.

Five isoniazid-resistant R strains formed true cords; they were classified as lethal. Two of these strains were lethal to guinea pigs; when injected intravenously, the other three were lethal to mice.

Acknowledgement: We desire to give our heartfelt thanks to Dr. Henry Bauer, Minnesota State Department of Health, for furnishing us the unknown cultures, and to Dr. Alfred Karlson, Mayo Clinic, Rochester, Minnesota, for the non-lethal strains of *Mycobacteria*.

CONCLUSIONES

Por medio de las inoculaciones al cuy, se hicieron pruebas de patogenicidad de 245 cepas de micobacterias; en otro laboratorio los mismos cultivos fueron ensayados respecto de su tendencia a hacer cordones en el medio líquido.

Tanto la inoculación al cuy como la tendencia a formar cordones, correspondieron a 192 cepas letales y 40 saprofitas con igual aptitud.

Los dos grupos arriba mencionados de micobacterias representan el 94.3 por ciento de las cepas estudiadas.

El resto del material consistió en 8 cepas que mostraron rudimentaria formación de cordones. Estas cepas no son letales a los cuyes pero causaron lesiones patológicas considerables en ellos. El origen de estas cepas a partir de las letales se supuso.

Cinco cepas resistentes a la isoniácida formaron verdaderos cordones; éstas fueron clasificadas como letales. Dos de estas cepas fueron letales para los cuyes; cuando se inyectaron intravenosamente las otras tres fueron letales para los ratones.

RESUME

La virulence de 245 souches de "mycobacterium" fut éprouvée par l'inoculation au cobaye. Dans un autre laboratoire, les mêmes cultures furent testées en fonction de leur tendance à se disposer sous forme de cordes en milieu liquide.

Les deux méthodes, inoculation au cobaye, et possibilité de formation de cordes, mirent en évidence avec la même efficacité 192 souches mortelles, et 40 souches saprophytes.

Les deux groupes de "mycobacterium" mentionnés représentèrent 94,3% des souches testées.

Le reste consistait en 8 souches N montrant une tendance à se disposer en cordes. Les souches ne furent pas mortelles pour le cobaye, mais pro-

voquèrent d'importantes lésions. On peut supposer que ces souches dérivèrent des souches mortelles.

Cinq souches R résistantes à l'isoniazide formèrent de véritables cordes. Elles furent classées comme mortelles. Deux de ces souches furent mortelles pour le cobaye; lorsqu'elles furent inoculées par voie intraveineuse, les trois autres furent mortelles pour la souris.

SCHLUSSFOLGERUNGEN

Die pathogenen Eigenschaften von 245 Stämmen von Mycobakterien wurden mit Hilfe von Meerschweinchenimpfungen geprüft; in einem anderen Laboratorium wurden die gleichen Kulturen auf ihre strangbildende Fähigkeit im flüssigen Nährboden geprüft.

Beide Methoden, die Meerschweinchenimpfung und die Fähigkeit zur Strangbildung, liessen 192 letale und 40 saprophytische Stämme mit gleicher Wirksamkeit erkennen.

Die beiden eben erwähnten Gruppen von Mycobakterien stellten 94,3% der geprüften Stämme dar.

Das übrige Material bestand aus 8 N-Stämmen mit Anzeichen rudimentärer Strangbildung.

Diese Stämme wirkten auf Meerschweinchen nicht letal, verursachten wohl aber beträchtliche krankhafte Veränderungen bei ihnen.

Die Herkunft dieser Stämme von letalen Stämmen wird vermutet.

5 INH-resistente Stämme bildeten echte Stränge; sie wurden als letal eingeordnet. 2 dieser Stämme waren für Meerschweinchen letal; bei intravenöser Injektion waren die 3 anderen für Mäuse letal.

BIBLIOGRAPHY

- Mayer, J. and Jensen, K. A.: "A Fatal Case of Tuberculosis Produced by BCG," *Amer. Rev. Tuberc.*, 70:402, 1954.
- Oeding, P., Hesselberg, J., Thrap-Meyer, H. and Waaler, E.: "Generalized BCG Infection in Man," *Acta Tub. Scand.*, 29:173, 1954.
- "Report of Panel Discussion on Survival and Revival of Tubercle Bacilli in Treated Tuberculous Lesions," *Am. Rev. Tuberc.*, 68:477, 1953.
- Steenken, W. Jr. and Wolinsky, E.: "Virulence of Tubercle Bacilli Recovered from Patients Treated with Isoniazid," *Am. Rev. Tuberc.*, 68:548, 1953.
- Peizer, L. R., Widelock, D. and Klein, S.: "Virulence in Guinea Pigs of Isoniazid-Resistant Cultures Isolated from Clinical Specimens," *Am. Rev. Tuberc.*, 68:290, 1953.
- Kaufmann, G., Wanner, J. and Amsler, H.: "Tuberkelbazillen in resezierten Lungenherden," *Schweiz. Zschr. f. Tuberk.*, 11:322, 1954.
- Fite, G. L. and Olson, B. J.: "The Infectivity of Mycobacteria for Chorioallantoic Membranes of Chick Embryo," *U. S. Weekly Publ. Health Rep.*, 59:423, 1944.
- Middlebrook, G., Dubos, R. J. and Pierce, C. H.: "Virulence and Morphologic Characteristics of Mammalian Tubercle Bacilli," *J. Exper. Med.*, 86:75, 1947.
- Richmond, L. and Cummings, M. M.: "An Evaluation of Methods of Testing the Virulence of Acid-fast Bacilli," *Am. Rev. Tuberc.*, 62:632, 1950.
- Bloch, H.: "Acid-fast Bacteria," *Annual Rev. Microbiol.*, 7:19, 1953.
- Karlson, A. G.: "Comparison of the Virulence for Mice and Guinea Pigs of an Isoniazid-Sensitive Tubercle Bacillus and its Isoniazid Resistant Variant," *Proc. Staff Meet. Mayo Clinic*, 29:119, 1954.
- Karlson, A. and Ikemi, Y.: "Effect of Isonicotinic Acid Hydrazide (Isoniazid) on Survival Time of Mice Infected with Tubercle Bacilli Resistant to the Drug *in Vitro*," *Proc. Staff Meet. Mayo Clinic*, 27:373, 1952.

Pulmonary and Circulatory Function of the Reexpanded Pneumothorax Lung*

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Introduction. The current trend away from pneumothorax is in part based on evidence indicating marked diminution in pulmonary function of the reexpanded lung after conclusion of treatment. However, this evidence is not extensive. The function of the reexpanded pneumothorax lung has been the subject of two spirometric^{1, 2} and three bronchospirometric investigations.^{3, 4, 5} Cournand and Richards¹ first discussed the effects of various types of collapse-therapy upon pulmonary function in 1941. They demonstrated impaired function in five cases of fibrothorax and five cases of empyema complicating pneumothorax. In a group of 11 uncomplicated reexpanded pneumothorax lungs they found diminished pulmonary function. There remained 66.5 per cent of predicted spirometric vital capacity (VC) and 53 per cent of predicted maximum breathing capacity (MBC). Other series of cases were too small to be representative.^{2, 3, 4} Bucher's and Gloor's series in which bronchospirometry was performed⁵ indicated much less reduction of pulmonary function than Cournand and Richards found. Thus the average spirometric VC in a series of 11 cases of uncomplicated pneumothorax lungs after reexpansion was 97 per cent and the MBC was 82 per cent of the predicted value. In 10 cases complicated by long standing effusion or empyema the VC was 70 per cent and the MBC 60 per cent of predicted value. The bronchospirometric VC of the reexpanded pneumothorax lung in the first group was 78 per cent and in the second 47 per cent of the predicted VC.

Because of the conflicting results of the few published studies on the function of the reexpanded pneumothorax lung, the following study was undertaken. It is based on determination of the pulmonary function of 47 suitable patients and of circulatory function in six of them.

Methods

MBC was determined using a 150 liter Tissot spirometer with 2.5 cm. tubing. The patients were tested in the standing position and were instructed to breathe through a Bennett mask as rapidly and as deeply as possible during a period of 30 seconds. The predicted normal MBC was calculated on the basis of age, sex and body surface. Spirometric studies were carried out with the patient in the sitting position in the non basal condition using a Benedict-Roth water spirometer. From the record of quiet respiration during a three minute period the resting minute

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TABLE I
Pulmonary and Circulatory Function of Reexpanded Pneumothorax Lung (RPL)

TABLE I Pulmonary and Circulatory Function of Reexpanded Pneumothorax Lung (RPL)													
	No. of Patients	Average Age Years	Sex		Average Duration of Collapse Months		Average Time After Reexpansion Months	Vital Capacity Percent of Predicted			Residual Volume Percent of Total Capacity	Alveolar Mixing Index Percent of Predicted	MBC Percent of Predicted
			M	F	Months	Months		Both Lungs	RPL	Contralateral Lung			
GROUP 1													
RPL with normal contralateral lung	8	43	7	1	22	45	66.5	50	83	-----	-----	72	
GROUP 2													
RPL with involvement of the contralateral lung	11	34	5	6	29	52	55	68	42	34.5 ^a	2.68 ^a	60	
GROUP 3													
Bilateral RPL	11	35	3	8	R: 33 L: 38	R: 54 L: 48	49	R: 54 L: 45	L: 45	41.5 ^a	2.98 ^a	69.5	
GROUP 4													
Fibrothorax	8	35	4	4	57	72	57	35	82	49 ^a	3.5 ^a	71	
GROUP 5													
Empyema	9	33	4	5	24	36	49.6	33.5	66	37 ^a	2.57 ^a	57	

^{a, b} In these groups, four, six and two patients were examined respectively.

TABLE I—(continued)
Pulmonary and Circulatory Function of Reexpanded Pneumothorax Lung (RPL)

	Minute Ventilation cc.			Minute Oxygen Uptake cc.			Ventilatory Equivalent L/100 cc.			Arterial Oxygen Saturation Percent			Pulmonary Artery Pressure mm. Hg.					
	Contra-lateral Lung			Contra-lateral Lung			RPL			Rest			Rest		Exercise			
	RPL	L	R	RPL	L	R	RPL	L	R	Syst.	Diast.	Mean	Syst.	Diast.	Mean	Syst.	Diast.	Mean
GROUP 1																		
RPL with normal contralateral lung	4290	5460		175	195		245	2.8		.....	.....	.....	24 ⁵	6 ⁵	12 ³	25 ³	10 ⁵	17 ³
GROUP 2																		
RPL with involvement of the contralateral lung	5360	4385		178	157		3	2.8		90.7 ⁵	88 ³	.....	.....	.....	.....	.....	.....	.....
GROUP 3																		
Bilateral RPL	4893	3543	R	212	120	L	2.3	2.9	L	91 ⁵	89.7 ³	.....	24 ⁵	9 ⁵	14 ³	43 ³	16 ⁵	33 ³
GROUP 4																		
Fibrothorax	2558	4854		72	287		3.3	1.7		88 ⁵	86 ³	.....	.....	.....	.....	.....	.....	.....
GROUP 5																		
Empyema	3440	5140		98	272		3.5	1.9		91 ⁵	89.6 ³	.....	.....	.....	.....	.....	.....	.....

^{2, 4, 5} In these groups, four, six and two patients were examined respectively.

ventilation and oxygen consumption were determined and the VC was measured. The predicted normal VC was calculated on the basis of age, sex and height. Residual volume was determined by the open circuit method of Darling, Cournand and Richards.⁶ Using this procedure the efficiency of alveolar mixing was determined from the percentage of alveolar nitrogen in the alveolar air after breathing of pure oxygen for seven minutes. Arterial oxygen content was measured at rest and immediately after moderate exercise by the Scholander method. Residual volume, intra-alveolar mixing index and arterial oxygen content were measured only in cases with suspicion of respiratory insufficiency.

Bronchspirometric studies were performed with a Sanborn twin spirometer and a soft rubber Zavod catheter of suitable size. The catheter was introduced after topical cocaine anesthetization, and its tip inserted into the left main bronchus. Pure oxygen was introduced and the VC, oxygen consumption and minute ventilation were measured.

Pulmonary arterial pressure (PAP) was measured by intravenous catheterization in six patients at rest and after standard exercise.

Results

The first group consisted of eight patients (Table I) with reexpanded unilateral pneumothorax in whom the contralateral lung was either normal or showed minimal disease. Four had a history of moderate or marked effusion; nevertheless, all but one had roentgenological evidence of pleural thickening. The MBC of this group was 72 per cent of the predicted value, higher than the 53 per cent found by Cournand and Richards. However, the reexpanded lung in this group lost an average of 50 per cent of its VC, and the contralateral lung 17 per cent. This later decrease of VC may be the result of distension emphysema, although this decrease may be within the range of normal variation. Leiner⁷ in his bronchspirometric studies before and after the induction of pneumothorax also found a slight decrease of VC in the contralateral side. The PAP was measured in two cases and normal values were found.

Marked restrictive insufficiency of the reexpanded lung characterized this group. The lung was fixed to the thoracic wall by mild or moderate pleural fibrosis which, however, did not invade or damage the lung parenchyma.

The second group consisted of 11 patients with reexpanded pneumothorax on one side and far advanced tuberculosis or collapse therapy on the contralateral side. In five there was moderate or marked effusion during the pneumothorax treatment. On the contralateral side, three had intrapleural pneumothorax (non-reexpanded), one had extrapleural lucite ball plombage, and one had paraffin plombage. In two phrenic crush had been performed, but at the time of bronchspirometry the paralyzing effect was over.

The average VC of the reexpanded lung in this group was 18 per cent higher than that of the preceding group. This increased value of VC

of the reexpanded pneumothorax lung when the contralateral side is severely damaged may be interpreted at the first glance as a compensatory phenomenon. However, this difference is probably not significant. There is no compensation by the contralateral lung for the loss of VC; the compensatory hyperfunction is achieved by increasing oxygen consumption. In four cases with one lung under collapse therapy and history of effusion on the reexpanded pneumothorax side there was evidence of arterial oxygen unsaturation at rest, more marked after exercise.

The *third group* consisted of 11 patients with bilateral reexpanded pneumothorax. There were six effusions on the right and four effusions on the left side. In six instances of measured residual volume five showed evidence of mild and one of severe emphysema. There was also evidence of arterial hypoxia in four. In these cases the PAP was also measured. Patient No. 62 had normal PAP in spite of the fact that she had bilateral pneumothorax of six years standing. Patient No. 63 with a history of bilateral pneumothorax of three years standing, right effusion and fibrosis of the right upper lobe had elevation of systolic PAP rising from 22.5 mm. Hg. at rest to 33 mm. after exercise. Patients No. 60 and 66 with history of bilateral effusion showed fairly conclusive evidence of hypertension of the lesser circulation at rest which was more marked during exercise: the systolic PAP rising from 27 and 30 at rest to 56 and 59 respectively.

The *fourth group* consisted of eight patients with unilateral fibrothorax. Four had effusion during collapse therapy, in another four the pleural peel was formed during reexpansion. The contralateral side was overdistended because of mediastinal shift to the fibrothorax side. In five there was active cavernous disease and in two the contralateral side had been previously treated with collapse therapy (one thoracoplasty, one phrenic crush). In four with involvement of the contralateral side there was moderate or advanced degree of emphysema and arterial oxygen unsaturation.

Bronchspirometric investigations showed that the ventilatory and respiratory functions of the fibrothorax lung were severely damaged in all cases, but that there was great inequality in the impairment of these two functions. In four the fibrothorax lung participated on the average in 38 per cent of the total ventilatory function, while its average oxygen consumption was only 13 per cent. On the other hand, in four other cases the respiratory function was better preserved than its ventilatory function, the fibrothorax lung showed greater oxygen consumption (32 per cent of total) than ventilation (21 per cent).

The *fifth group* consisted of nine cases of empyema as a complication of artificial pneumothorax. There were two of uncontrolled empyema and seven brought under control by repeated aspirations, oleothorax or open drainage. In four both the ventilatory and respiratory functions were poor. In five other cases there was only moderate pleural thickening after control of empyema and not only was the pulmonary function relatively preserved but the lung showed respiratory hyperfunction.

Discussion

Forlanini was of the opinion that after reexpansion the pneumothorax lung would regain its normal function.⁸ Studies of the collapsed pneumothorax lung particularly emphasized the differences between an uncomplicated and a complicated pneumothorax.⁹⁻¹² An uncomplicated long-standing collapse may cause a slight fibrosis of the interalveolar septa, cuboidal metaplasia of the alveolar cells and slight pleural fibrosis possibly due to the irritant action of the air. The vessels of precapillary size in collapsed but otherwise normal parenchyma showed hyaline thickening of the wall.¹³ In pneumothorax complicated by effusion severe interstitial pulmonary fibrosis is sometimes found.

Some claim, however, that there is never an uncomplicated pneumothorax, and the expression "reexpanded lung" is a misnomer.³ The air in the pneumothorax space is reabsorbed but the lung does not reexpand to the pre-treatment volume. A pleural dead space results which later is filled by organized fibrinous peel. Shifting and fixation of the mediastinum, elevation and fixation of the diaphragm, and retraction of the chest wall also compensate for the shrinkage of the so-called reexpanded lung. However, Mitchell found that in 312 patients after abandonment of pneumothorax there was no thickening of the pleura in 20 per cent, slight thickening in 57 per cent, and moderate to marked in 23 per cent.¹⁴

Considering the fact that pneumothorax is generally instituted in limited lesions, the fibrosis of the original lesions and accompanying distension emphysema cannot contribute much to the decrease of pulmonary function.

Pulmonary pleurogenic fibrosis is a much more important factor in impairment of pulmonary function of the reexpanded pneumothorax lung. It may present itself as a rigid frame of white scar tissue of cartilaginous consistency or as a filmy sheet covering the visceral surfaces.¹⁵ This "fibrosis of Brouardel"¹⁶ invades the lung like the teeth of a comb through the interstitial spaces and obliterates bronchi and vessels. Bronchograms show a picture of "broken twigs" or "autumnal trees" without foliage. Angiograms appear to indicate arterial occlusion.

Comparison of angiopneumographic and bronchspirometric studies¹⁷ showed that in the lung with diminished oxygen consumption there is always comparable reduction of the circulation. Vascular fibrosis causes an increase in the vascular resistance of the corresponding area of the lung and shunts the blood to a greater or lesser extent away from affected zone towards unaffected areas. According to some authors¹⁸ the fact that the pulmonary arteries are not filled during angiography does not indicate that they are poorly perfused with blood, since at operation they bleed profusely. However, the blood they transmit is oxygenated blood coming through anastomoses with the bronchial arteries (left-right shunt). In angiography the contrast medium does not enter the pulmonary artery to any large extent because it meets a counter current from the bronchial arteries.

The evolution of pulmonary pleurogenic fibrosis depends on the character of the effusion (allergic, infectious or suppurative) and its duration,¹⁹ but in general it is unpredictable. The evidence that there are relatively well ventilated lungs with poor circulation and lungs with good circulation and poor ventilation, as was shown in the study of our fibrothorax group, indicates that both the degree and distribution of this fibrosis varies considerably. The prevalence of one of the two processes: compression of the fibrous frame of pachypleuritis or vascular fibrosis was a deciding factor in this ventilo-respiratory dissociation. Bruce in his study of fibrothorax lung⁴ found that oxygen consumption of the "reexpanded" fibrothorax lung was more reduced than ventilation and the elimination of carbon dioxide. In one case oxygen consumption was completely abolished and the lung functioned only in the elimination of carbon dioxide.

With increasing restriction in the indications for pneumothorax and improvement of methods of its management there are fewer complications and subsequent pleurogenic fibrosis is now much rarer than it was 15 years ago. In Cournand and Richards' study in 1941 the decrease of pulmonary function of the reexpanded pneumothorax lung was less than in other types of collapse therapy. It is therefore surprising that their investigation became the basis of the subsequent anti-pneumothorax trend. In our material pulmonary function values of the reexpanded pneumothorax lung were in general higher than those of Cournand and Richards, but lower than those of Bucher and Gloor.

SUMMARY

The reexpanded lung after pneumothorax was found to lose an average of 50 per cent of its vital capacity. If the collapse was not complicated by fibrothorax or empyema, it generally preserved its respiratory function. The loss of vital capacity was not compensated by the contralateral side as was oxygen uptake. The reexpanded lung is capable of considerable respiratory hyperfunction in case of disease or collapse in the contralateral side.

In the reexpanded bilateral pneumothorax the loss of total vital capacity was about 50 per cent. In some cases increase of residual volume and hypoxemia due to distension emphysema was found.

The main factor in the impairment of pulmonary function of the reexpanded pneumothorax lung is pulmonary pleurogenic fibrosis. Fibrothorax and empyema severely damage the pulmonary function, although in some cases respiratory function is partly preserved if the pleural fibrosis does not invade the interstitial spaces. The higher ventilatory equivalent in these group is evidence that oxygen consumption is damaged more than ventilation. The reduction of the respiratory function of the reexpanded pneumothorax lung is usually compensated for by increase in oxygen uptake of the contralateral lung, i.e., the compensation is achieved through the pulmonary artery system. Nevertheless pulmonary hypertension was found only in a few cases of long-standing bilateral collapse with effusion.

RESUMEN

El pulmón reexpandido después de neumotórax, se encontró que pierde un término medio de 50 por ciento de su capacidad vital. Si el colapso no se complicó con fibrotórax o empiema, su función respiratoria generalmente se conserva. La pérdida de capacidad vital no fué compensada por el lado contrario como lo es la captación de oxígeno. El pulmón reexpandido es capaz de considerable hiperfunción en caso de enfermedad o colapso del contralateral.

En el neumotórax bilateral reexpandido la pérdida de capacidad vital fué alrededor de 50 por ciento. En algunos casos se encontró aumento del volumen residual e hipoxemia debida a distensión por enfisema.

El principal factor del daño a la función pulmonar en el neumotórax reexpandido, es la fibrosis pleurógena.

El fibrotórax y el empiema dañan severamente la función pulmonar aunque en algunos casos la función pulmonar es conservada en parte si la fibrosis no invade los espacios intersticiales. El más alto equivalente ventilatorio en estos grupos, evidencia que el consumo de oxígeno es más perjudicado que la ventilación.

La reducción de la función respiratoria del pulmón reexpandido es generalmente compensada por el aumento de captación del oxígeno por el otro lado y la compensación es efectuada por el sistema de la arteria pulmonar. Sin embargo, la hipertensión pulmonar se encontró sólo en pocos casos de colapso bilateral de larga duración, con derrame.

RESUME

Le poumon reexpandu après l'abandonement du pneumothorax artificiel perd la moitié de sa capacité vitale. Si le collapse n'était pas compliqué par le fibrothorax ou l'empyème sa fonction respiratoire est préservée. La perte de la capacité vitale n'est pas compensée par le poumon contralateral comme est compensée la consommation d'oxygène. Dans le cas d'affection du poumon contralateral, le poumon reexpandu est capable d'une hyperactivité respiratoire considerable. Dans le pneumothorax bilateral la perte de la capacité vitale totale est de 50 pour cent. Dans ce groupe on a noté dans quelques cas l'augmentation du volume résiduel et une hypoxémie due à l'emphyème de distension.

La fibrose pulmonaire pleurogène est le facteur le plus important de l'endommagement de la fonction pulmonaire, comme on le voit dans le fibrothorax et l'empyème. Cependant quelquefois la fonction respiratoire est sauvée si la fibrose pleurale ne pénètre pas dans les espaces interstitiaux. Le haut coefficient d'utilisation d'oxygène dans ces groupes montre que la consommation d'oxygène est plus endommagée que la ventilation. L'insuffisance ventilatoire du poumon reexpandu est compensée par l'accroissement de la consommation d'oxygène, c.à.d. la compensation est faite par le système de l'artère pulmonaire. Cependant l'hypertension dans la petite circulation n'a pas été trouvée que dans quelques cas où il y'avait une histoire d'un collapse bilateral avec un exudat.

ZUSAMMENFASSUNG

Es zeigte sich, dass die nach Pneumothorax wieder entfaltete Lunge im Durchschnitt 50% ihrer Vitalkapazität verloren hatte. War der Kollaps nicht durch einen Fibrothorax oder ein Empyem kompliziert, bewahrte sie im allgemeinen ihr respiratorisches Vermögen. Der Verlust an Vitalkapazität wurde nicht durch die Gegenseite kompensiert wie bei der Sauerstoffaufnahme. Die Wiederausgedehnte Lunge ist zu beträchtlicher respiratorischer Hyperfunktion fähig in Fällen von Erkrankung oder Kollaps der Gegenseite.

Beim wieder ausgedehnten bilateralen Pneumothorax betrug der Verlust der gesamten Vitalkapazität ungefähr 50%. In einigen Fällen fand sich eine Zunahme der Residualluft und eine Hypoxämie infolge des Dehnungs-Emphysems. Den Hauptfaktor bei der Beeinträchtigung der Lungenfunktion der wieder ausgedehnten Pneumothorax-Lunge stellt die pulmonale pleurogene Fibrose dar. Fibrothorax und Empyem schädigen die Lungenfunktion in erheblichem Grade, auch wenn gelegentlich die respiratorische Funktion teilweise erhalten ist, falls nämlich die pleurale Fibrose nicht in die interstitiellen Spalträume eindringt. Das höhere Atemäquivalent in dieser Gruppe ist das Zeichen dafür, dass die Sauerstoffaufnahme mehr Schaden gelitten hat als die Ventilation.

Die Verringerung der respiratorischen Funktion der wieder ausgedehnten Pneumothorax-Lunge wird für gewöhnlich ausgeglichen durch eine höhere Sauerstoffaufnahme der Lunge der Gegenseite, d.h. der Ausgleich kommt zustande durch das pulmonale Arteriensystem. Trotzdem wurde ein pulmonaler Hochdruck nur in wenigen Fällen von lang dauerndem beidseitigem Kollaps mit Erguss festgestellt.

REFERENCES

- 1 Cournand, A. and Richards, D. W.: "Pulmonary Insufficiency. II. The Effects of Various Types of Collapse Therapy Upon Cardio-Pulmonary Function," *Am. Rev. Tuberc.*, 44:123, 1941.
- 2 Birath, G.: "Pulmonary Function Following Pneumothorax," *Am. Rev. Tuberc.*, 55:349, 1947.
- 3 Pinner, M., Leiner, G. and Zavod, W. A.: "Bronchospirography," *J. Thoracic Surg.*, 11:241, 1942.
- 4 Bruce, N.: "Bronchspirometric Studies of the Lung Function after Concluded Pneumothorax," *Acta Tuberc. Scand.*, 20:68, 1946.
- 5 Bucher, H. and Gloor, R.: "Bronchspirometrische Untersuchungen nach abgeschlossener Pneumothoraxbehandlung und nach Dekortikation," *Schweiz. Ztschr. Tub.*, 10:265, 1953.
- 6 Darling, R. C., Cournand, A. and Richards, D. W.: "Studies on the Intrapulmonary Mixing of Gases. III. An Open Circuit Method for Measuring Residual Air," *J. Clin. Invest.*, 19:609, 1940.
- 7 Leiner, G.: "Spirometric and Bronchspirometric Studies on Pneumothorax," *Am. Rev. Tuberc.*, 50:267, 1944.
- 8 Forlanini, C.: "Ueber die respiratorische Funktion der durch künstlichen Pneumothorax geheilten, nach der Behandlung wieder ausgedehnten Lunge," *Deutsche Med. Wochenschr.*, 37:248, 1911.
- 9 Bruns, O.: "Ueber die praktische Bedeutung der Zirkulations-änderung bei einseitigem Lungenkollaps bei therapeutischen Eingriffen an der Lunge," *Beitr. z. Klin. d. Tuberc.*, 29:253, 1914.
- 10 Lindblom, A. F.: "Ueber die Funktionsfähigkeit der mit Pneumothorax artificialis behandelten Lunge nach ihrer Wiederentfaltung," *Acta Med. Scand.*, 15: Suppl. 1936.

- 11 Roubier, C.: "Consequences anatomiques de la compression de poumon par le pneumothorax artificiel," *Presse Méd.*, 33:447, 1925.
- 12 Gardner, L. U.: "The Pathology of Artificial Pneumothorax in Pulmonary Tuberculosis," *Am. Rev. Tuberc.*, 10:501, 1925.
- 13 Denst, J., Hurst, A. and Dressler, S. H.: "A Histologic Study of the Blood Vessels in Surgically Resected Tuberculous Lungs," *Am. Rev. Tuberc.*, 64:489, 1951.
- 14 Mitchell, R.: "Artificial Pneumothorax. A Statistical Analysis of 557 Cases Initiated in 1930-1939, and Followed in 1949," *Am. Rev. Tuberc.*, 64:1, 1951.
- 15 Pinner, M.: "Pathology of Pulmonary Collapse." In J. Alexander's *The Collapse Therapy of Pulmonary Tuberculosis*, Springfield, Illinois: Charles C Thomas, Publisher, 1937, P. 69.
- 16 Laval, P., Payan, H., Metras, H. and Warnery, M.: "Les lésions histologiques parenchymateuses dans les pièces d'exérèse pulmonaire après collapsothérapie prolongée pour tuberculose," *Revue de la Tub.*, 16:115, 1952.
- 17 Rimini, R., Rodriguez, A., Burgos, R., Duomarco, L., Sapriza, J. and Surraco, G.: "Contribution of Angiopneumography to Some Problems of Pulmonary Physiopathology," *Dis. Chest*, 22:539, 1952.
- 18 Rosenburg, J. G. and Deenstra, H.: "Bronchial Pulmonary Vascular Shunts in Chronic Pulmonary Affections," *Dis. Chest*, 26:664, 1954.
- 19 Carrol, D., McClement, J., Himmelstein, A. and Cournand, A.: "Pulmonary Function after Decortication," *Am. Rev. Tuberc.*, 63:231, 1951.

Pulmonary Cryptococcosis

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Cryptococcus neoformans is a fungus that has a predilection for the central nervous system, lungs and skin. As cryptococcal infections in man have been recognized more frequently in recent years surgical interest in these lesions has increased. To date medical control of cryptococcosis has been possible only rarely and the prognosis becomes almost hopeless once the disease has become disseminated. However, as Taber¹ first suggested, "early surgical removal of a circumscribed area of torulosis seems as logical to me as the early removal of carcinoma." This dictum is proving to be especially apt in regard to lesions of the lung which apparently are curable in the early localized stage but become incurable with dissemination of the fungus.

Cryptococcus neoformans or *Torula histolytica* is a non chlorophyll-producing plant which reproduces only by budding. As the reproductive cycle is always asexual, the *Cryptococcus* is classified with the Fungi Imperfecti, as are most pathogenic fungi. The organism is a spherule varying in size from 5 to 20 microns. On ordinary media it does not produce the elongated vegetative form known as the mycelium. Each organism is surrounded by a large gelatinous capsule easily demonstrated by an India ink preparation.

The *Cryptococcus* grows well on Sabouraud's glucose agar at room temperature, less well at 37 degrees centigrade and is killed at 40 degrees. At room temperature the early yeast like colonies may be white, wrinkled and granular, but on further growth become mucoid, slimy and moist with brownish discoloration. If grown at 37 degrees, the colony is light cream to brown in color, mucoid and slimy so as to resemble Friedlander's bacillus.

Rats and mice are the most susceptible laboratory animals, with the guinea pig only slightly less so. The rabbit with a normal body temperature of 39.4 degrees centigrade is practically immune. The organism has been isolated from many domestic animals, such as the cow with cryptococcal mastitis and the horse with pulmonary lesions. It has been likewise reported in many wild animals, even including the captive chetah (hunting leopard).

Cryptococci have been found occurring abundantly as saprophytes in every part of the world. The mode of transmission is unknown and it is only rarely pathogenic for man. It is not transmitted from man to man, nor does it appear to have been transmitted to man from infected animals.

It is thought that ordinarily the fungus enters the body through the lungs, though it may enter through the skin or intestinal tract. Primary pulmonary cryptococcosis is relatively common and has been seen frequently preceding or coexisting with the cryptococcal meningitis which

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is the most common form of the disease and almost universally fatal.

After the primary infection of the lung, the spread is probably by the blood and lymphatics. Wade and Stevenson³ injected mice intracerebrally, intravenously, intraperitoneally, intratracheally and subcutaneously and never observed central nervous system involvement without marked visceral involvement, particularly in the lung, liver and lymph nodes. Intranasal inoculation produced rhinitis and sinusitis, but they were unable to demonstrate any evidence of an invasion of the central nervous system through the cribriform plate.

Pathology

Cryptococcus neoformans is one of the most inert of all fungi and may remain in the tissues for long periods of time without stimulating marked inflammatory response. Later a chronic inflammatory reaction may be noted and a granulomatous lesion produced, at times suggesting Hodgkin's disease or Boeck's sarcoid. When systemic involvement produces marked enlargement of cervical, mediastinal and abdominal lymph nodes and an enlarged spleen the differentiation from Hodgkin's disease may be difficult. The two have been confused or found to coexist with a surprising frequency, as Gendel et al⁴ record 14 such cases. However, in experimental animals Fitchett and Weidman⁵ were able only once to produce lesions suggestive of Hodgkin's disease.

The only case of cryptococcosis ever found at the Mississippi State Sanatorium other than that reported below had a diagnosis of Boeck's sarcoid made from a scalene lymph node removed because of undiagnosed bilateral pulmonary infiltrates. This young girl later died of meningitis proved to be due to *Cryptococcus neoformans* and it is thought the entire process represented cryptococcosis.

It is quite common to see large cystic spaces, particularly in the brain, filled with large masses of fungi with little or no surrounding inflammatory response. Even in fatal cases of meningitis the meninges may appear grossly almost normal. Occasionally there is a chronic inflammatory reaction in the brain with formation of tubercle-like structures.

In general the fungus and its capsular material have been found to be so weakly antigenic that only a low titer in the serum can be obtained. Recently Neill and coworkers⁶ have been able to demonstrate precipitable antigens from the spinal fluid, blood and urine. The diagnostic importance of these tests is yet to be evaluated. Likewise skin testing to determine the presence of an allergic state has as yet not been sufficiently tried to justify it as a diagnostic procedure.

Clinical Findings

The onset of the disease is usually insidious and varied, depending on the parts attacked. In the lungs the clinical picture usually suggests tuberculosis or a tumor. A cough may develop with little or no expectoration, fever or night sweats. There may be mild chest pain, fatigability and weight loss. Many patients, especially in the tropics, develop chronic bronchitis.

Physical examination will usually disclose no abnormal signs other than a few bronchial or sub-crepitant rales at the lung bases. Ordinarily the blood picture varies little from normal, though occasionally even a marked leukocytosis may be noted.

The disease may run its course in a few weeks or months or it may persist for many years. The infection usually pursues a slow and benign course until the central nervous system is invaded. Once this has occurred, the clinical course of the patient is steadily and more rapidly downward with a picture of meningitis, encephalitis, or brain tumor.

The diagnosis may be difficult, as early in the pulmonary infection organisms are not present in the sputum though they will appear during the latter stages of the disease. Present immunological tests and skin tests are of limited, if any, value. Once meningitis has developed organisms may be found in the spinal fluid. Within the lung, viscera, lymph nodes or skin, diagnosis is usually made by biopsy or resection. No one has as yet reported making the diagnosis of localized pulmonary cryptococcosis prior to operation.

The early x-ray film findings, as reported by Greening and Menville⁷ show pulmonary involvement to be greatest at the lung bases. There may be patches of homogenous consolidation with little surrounding reaction. All of these become confluent with the formation of cavities of varying sizes. Healing processes are noted with marked fibrosis. Usually only slight hilar lymph node enlargement is present and bone involvement is rare.

Many cases have been noted with solitary lesions in the lung. Most of these have been solid lesions varying in size from approximately two to eight centimeters. They were localized though not definitely circumscribed and there was nothing diagnostic about the lesion.

Treatment

In a recent review of 220 published cases of cryptococcosis Carton⁸ found only 33 patients alive at the time of the reports. Of this group 14 had central nervous system involvement and only one could be considered cured. However, of 19 patients with non-central nervous system involvement, 13 could be considered cured. These included lesions of the bone, scalp, skin, lung and nasopharynx, most of which had been treated by excisional therapy.

Innumerable drugs have had a clinical trial, including the iodides, actidiones, sulfonamides, broad spectrum antibiotics, stilbamidines, the heavy metals, various vaccines and even fever therapy—all with limited value. Because of the almost universal ineffectiveness of the wide variety of drugs used in the treatment of central nervous system and disseminated cryptococcosis, we feel it is important to stress the early surgical attack on localized lesions.

There have been reported to date a total of 13 pulmonary lesions subjected to resection. Dormer et al⁹ reported resection of the right upper and middle lobes of a 12 year old South African native for a large granu-

loma due to *Cryptococcus*. Twenty-three days postoperatively the patient developed meningitis and this was proved by guinea pig injection to be also due to the same organism. The patient made no response to sulfadiazine but did make an excellent response to the iodides and was discharged two weeks later apparently cured. No subsequent follow-up has been reported.

Froio and Bailey¹⁰ removed a 4.5 centimeter solid lesion in the right lower lobe of a 19 year old white male by pneumonectomy with the patient remaining well for over five years. McConchie reported three cases treated with pulmonary resections; however, one developed cerebral involvement and a second had a contralateral pulmonary lesion. The third apparently did well.

Palmrose and Losli¹² reported a segmental resection of a solid mass due to *Cryptococcus*. This was followed by the death of the patient due to cerebral involvement four years later. Berk and Gerstl¹³ reported removal of a $7 \times 6 \times 6$ centimeter firm encapsulated granuloma of the left upper lobe in a 30 year old white male who remained alive and well four years later at the time of their report. They likewise strongly urged the removal of these localized lesions before dissemination of the disease. Poppe,¹⁴ in 1954, reported two cases with solid granulomatous processes which were resected with early good results. One had the right upper lobe removed for a four centimeter mass and the second, a 31 year old white male, had a right pneumonectomy for an inflammatory process involving all lobes.

Corpe and Parr¹⁵ reported sub-segmental resection of a cavitary lesion due to *Cryptococcus*. This patient, a 19 year old white man, previously had had proved tuberculosis in this same region at the apex of the left



FIGURE 1

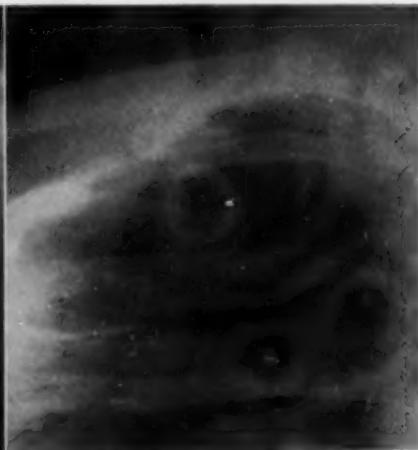


FIGURE 2

Figure 1: Pre-operative roentgenogram, which revealed no change in the lesion during the one year and eight months prior to surgery. Note the small ring shaped cavity just within the circle of the right first rib.—*Figure 2:* Roentgenogram made in lordotic position to demonstrate more adequately the small cavity at the right apex.

lower lobe and the left upper lobe. While under observation he developed a solid lesion thought to be a tuberculoma. When later this solid lesion excavated it was resected. However, the pathology report revealed a cavitary lesion containing an inspissated and gelatinous yellow-gray debris which was filled with *Cryptococcus* organisms and showed no evidence of residual tuberculosis. A three month follow-up reported an early good result.

Baker¹⁶ mentions three cases of cryptococcosis of the lung in his registry, all of which were solid lesions varying from the size of a plum to that of an orange. The lesion was solitary in two and double in one case. In two cases the right lower lobe was resected and in the third an upper lobe was removed. These three patients remained in good health at the time of his report nine months, nine and one-half months and four years post-operatively.

Thus of the previously reported 13 cases, nine patients at the time of their report appeared to be completely cured. One had postoperative meningitis presumably cured by iodide treatment. One died of meningitis, another had meningitis untreated and one had a contralateral pulmonary lesion, presumably also due to *Cryptococcus*.

Case Report: R. Y. B., a 20 year old white male student, was first seen in the out patient department of Mississippi State Sanatorium September 21, 1953. He was referred because a routine x-ray film in November of 1952 had revealed a lesion in his right upper lobe. A routine x-ray film in September 1952 had not been reported to him and so had been presumed to be negative.

He presented no subjective complaint or objective findings. He had lived all his life in Mississippi and had traveled only in the South. Examinations of the blood, urine, serology, stool and sputum were all completely negative. His chest x-ray films revealed a 1.5 centimeter, ring shaped density under the first rib on the right. A review of the x-ray film made in November 1952 revealed this ring lesion to have shown no change.

No diagnosis could be made and as the patient would not accept hospitalization or surgery as advised, it was decided that he should be observed and frequent chest x-ray films made. The lesion persisted and it was urged that it be removed as soon as he completed his school year.

In April 1954 he was started on streptomycin, 1 gram twice a week and PAS, 3 grams four times a day in preparation for resection of the lesion, which was presumed to be of tuberculous origin.

He was admitted to the hospital June 7, 1954, again completely asymptomatic. He denied all chills, fever, weight loss, anorexia, chest pain, arthralgia, cough, sputum or hemoptysis. Physical examination revealed a well developed, well nourished, healthy white male. There were no skin lesions or enlarged lymph nodes. The lungs were clear to percussion and auscultation. The abdomen showed the well healed right mid-abdominal scar of an appendectomy without other abnormality.

Laboratory Data

A chest x-ray film at this time again revealed the thin walled cystic lesion at the right apex which had shown no change since the first film made here nine months previously (Figures 3 and 4).

Blood counts revealed 6.1 million red cells with 18.5 grams hemoglobin. The white count was 5,600 with one basophil, five eosinophils, six stabs, 53 segs., 30 lymphocytes and five monocytes. Examinations of the urine, stool and sputum revealed no abnormality and the serological test was negative.

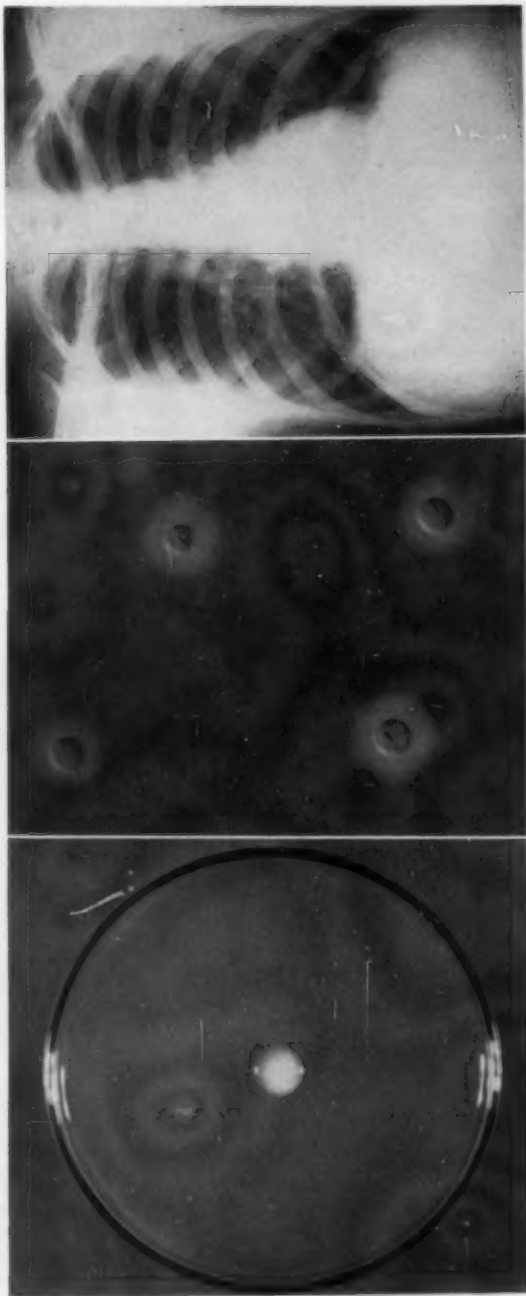


FIGURE 3

FIGURE 4

FIGURE 5

Figure 3: Photograph of one week old colony of *Cryptococcus* grown at room temperature on Sabouraud's glucose agar.—Figure 4: Photomicrograph of India Ink preparation of the *Cryptococcus* grown at room temperature. Note the characteristic wide gelatinous capsules (X 480).—Figure 5: Roentgenogram made eight months post-operatively. The lung fields are now completely clear.

Operation

On June 15, 1954, right thoracotomy was performed. The lower and middle lobes appeared normal. In the exact apex of the right upper lobe was a firm lesion with minimal puckering of the overlying pleura. This diseased area was widely circumscribed and excised by a wedge resection. Examination of the specimen revealed a fairly thin walled cyst filled with a thin yellowish-gray fluid which did not appear caseous. There was minimal induration of the pulmonary tissue surrounding the cyst. One small focus of calcification was noted in the wall of the cavity. A portion of the specimen was submitted for smear and culture and the remainder for microscopic section.

Microscopic Description

"Sections of the wall of this cavity show three general zones. There is an inner lining of exudate in which there is amorphous bluish and pink material and moderate numbers of neutrophils. Within this zone particularly are noted aggregates and scattered single structures that stain blue-gray with hematoxylin. They measure approximately 4 microns across and generally are surrounded by a clear space. The next zone is that of hyalinized necrotic material and the third outer zone is one of chronic granulomatous inflammation with occasional giant cells present. The identity of the organisms described in the exudate was suspected to be *Cryptococcus neoformans* (Figure 1). This was confirmed by preparations of India ink in which typical encapsulated budding organisms were demonstrated" (Figure 2).*

Cultures from the resected lesion likewise revealed a pure growth of *Cryptococcus neoformans*. The postoperative course was completely uneventful. Further sputum studies were negative for *C. neoformans* as were further urine specimens. X-ray films of the skull revealed no abnormality. A lumbar puncture was performed in an attempt to rule out sub-clinical meningitis. However, the spinal fluid was clear with normal dynamics and no organism was found on smear or culture.

On the advice of Dr. W. G. Morson of the research department of the Wm. S. Merrell Company, a course of 2-hydroxystilbamidine was started prior to his discharge, 225 milligrams being injected intravenously two times a week. The injections were continued at home under the care of his local physician, for a total of 25 doses.

He was discharged on July 8, 1954. A follow-up x-ray film on February 16, 1955, revealed no pulmonary abnormality (Figure 5). He has returned to full activity and remained completely asymptomatic when last heard from in August 1955.

*Sections read by Dr. Kenneth M. Heard, Pathologist, Mississippi Baptist Hospital, Jackson, Mississippi.

Discussion

This case is unusual in that its only the second reported solitary nodular lesion of the lung to have presented a cystic appearance by x-ray film, though some of the more generalized cryptococcal infections of the lung may produce cavitation. The only other solitary cystic lesion is that reported by Corpe and Parr of a solid lesion that later excavated. In our case the initial x-ray appearance was that of a cyst.

Whether or not the postoperative use of 2-hydroxystilbamidine was of value cannot be determined. Morson¹⁷ has a limited clinical experience to indicate that this drug may be helpful in more generalized forms of cryptococcosis. In view of the completely negative studies for any other site of infection, and the experience of others which indicates that resection of the pulmonary focus is often curative, this treatment well may have been over zealous. However, if there were a minimal residual nidus of infection, it would have been more susceptible to cure at this time than at any time later when clinical manifestations became evident.

The entire question of pathogenicity of the *Cryptococcus* for man is as yet shrouded in mystery. That a completely ubiquitous organism should only on rare occasion become pathogenic for man may depend on occasional variations in its virulence, or the increased hypersensitivity or lowered resistance of the persons affected. Similarly, why this infection should remain quiescent in the lung for such long periods prior to generalized dissemination is not known. It is true that the organism is of extremely low pathogenicity in most tissues of the body except the brain and the meninges, in which it becomes rapidly devastating.

The medical outlook at the moment is not cheerful. Once dissemination or meningitis has occurred this disease becomes almost 100 per cent fatal. The encouraging aspect has been the extremely high percentage of successful cures with early surgical removal of the localized lesions, predominantly those of the lung. Of a total of 14 reported resections for cryptococcosis of the lung, so far as is known on a limited follow-up, 10 have done well. The correct preoperative diagnosis has not been made in any case treated by resection. In none reported has cryptococcosis even been suspected prior to surgery. Apparently once the sputum contains *C. neoformans* the disease process is too generalized for successful resections. In most instances the preoperative diagnosis has been that of tumor or chronic infection such as tuberculosis. The excellent prognosis of these cases when treated by early resection we feel gives another reason for the early surgical removal of all lesions of the lung persistent after brief medical treatment.

Addendum: We have subsequently resected a second cryptococcal pulmonary lesion. L. H., a 26 year old white man, had been treated for proved tuberculosis of the left upper lobe in 1950. He remained asymptomatic until February 1955, when he had a mild lower respiratory infection without sequelae except fatigability. A chest x-ray in July 1955 showed a dense cavitary lesion in the right apex. As all studies were negative and the lesion did not respond to tuberculous antibiotics as expected, a right upper lobectomy was performed on Dec. 2, 1955. Dense thick walled cavities, up to 3 cm. in diameter filled with thick purulent material, were present in the apical and posterior segments with minimal surrounding inflammatory reaction. Smear, culture,

and microscopic sections all revealed *Cryptococcus neoformans*. Both patients reported here remain well as of September 1, 1956.

SUMMARY

1. The physical, pathogenic and immunologic characteristics of *Cryptococcus neoformans* are outlined.

2. A brief description of the clinical and laboratory findings of cryptococcal infections of the lung is presented.

3. Pulmonary cryptococcosis often produces solitary lesions in the lung that are amenable to surgical cure. If unresected these often lead to dissemination and fatal outcome as present medical treatment is not reliable.

4. As the diagnosis has not been made preoperatively in a single resectable lesion to date, the urgency of resecting all undiagnosed persistent pulmonary lesions is again stressed.

5. A case of successful resection of a pulmonary cryptococcal cyst is presented. This is the second such case to be reported.

RESUMEN

1. Se describen las características físicas, patogénicas, e inmunológicas del *Criptococo Neoformans*.

2. Se presenta una descripción breve de los hallazgos clínicos, y de laboratorio en las infecciones por criptococos en el pulmón.

3. La criptococcia pulmonar a menudo produce lesiones solitarias en el pulmón que son susceptibles de curarse quirúrgicamente. Si no se resecan estas lesiones pueden conducir a la diseminación y a la muerte ya que actualmente no hay tratamiento médico eficaz.

4. Como no se ha hecho el diagnóstico en ningún caso preoperatoriamente, se recalca la urgencia de reseca toda lesión persistente en el pulmón si no se ha llegado a diagnóstico.

5. Se presenta un caso de resección con éxito de un quiste pulmonar de criptococos. Este es el segundo caso que se ha publicado.

RESUME

1. Les auteurs esquissent les caractères physiques, pathogéniques et immunologiques du "*cryptococcus neoformans*."

2. Ils font une brève description des constatations cliniques et biologiques des infections cryptococciques.

3. La cryptococcose pulmonaire produit souvent des lésions isolées du poumon, qui relèvent du traitement chirurgical. Si elles ne sont pas extirpées, les lésions entraînent souvent la dissémination et la mort, car on ne peut rien espérer du traitement médical actuel.

4. Comme le diagnostic peut n'être pas fait avant l'intervention pour une lésion isolée qui, prise à temps, aurait pu être opérée, l'auteur insiste de nouveau sur la nécessité absolue de pratiquer l'exérèse de toute lésion pulmonaire persistante et n'ayant pu être diagnostiquée.

5. Les auteurs présentent un cas de kyste pulmonaire cryptococcique, qui a été l'objet d'une exérèse suivie de succès. C'est le second cas semblable qui soit rapporté.

ZUSAMMENFASSUNG

1. Die physikalischen, pathogenetischen und immunologischen Eigenschaften des *Cryptococcus neoformans* werden umrissen.

2. Eine kurze Beschreibung wird gegeben über die klinischen und Laboratoriums-Befunde der *Cryptococcus*-Infektionen der Lunge.

3. Die pulmonale Cryptococcose bildet oft solitäre Herde in der Lunge, die chirurgischer Heilung zugänglich sind. Ohne reseziert zu werden, führen diese oft zur Streuung und zu letalem Ausgang, da die derzeitige interne Behandlung nicht zuverlässig ist.

4. Da die Diagnose bei einem einzelnen resezierbaren Herd gegenwärtig preoperativ noch nicht hat gestellt werden können, wird die Dringlichkeit der Resektion von allen nicht diagnostizierten persistierenden Lungenherden noch einmal betont.

5. Ein Fall einer erfolgreichen Resektion einer pulmonalen *Cryptococcus*-Cyste wird dargestellt; er ist der 2. derartige Fall, über den berichtet wird.

REFERENCES

- 1 Taber, K. W.: "Torulosis in Man," *J.A.M.A.*, 108:1405, 1937.
- 2 Kuhn, L. R.: "Growth and Viability of *Cryptococcus Hominis* at Mouse and Rabbit Body Temperatures," *Proc. Soc. Exper. Biol. and Med.*, 41:573, 1939.
- 3 Wade, L. J. and Stevenson, L. D.: "Torula Infection," *Yale J. Biol. and Med.*, 13: 467, 1941.
- 4 Gendel, B. R., Ende, M. and Norman, S. L.: "Cryptococcosis: A Review with Special Reference to Apparent Association with Hodgkin's Disease," *Am. J. Med.*, 9:343, 1950.
- 5 Fitchett, M. S. and Weidman, F. D.: "Generalized Torulosis Associated with Hodgkin's Disease," *Arch. Path.*, 18:225, 1934.
- 6 Neill, J. M., Sugg, J. V. and McCauley, D. W.: "Serologically Reactive Material in Spinal Fluid, Blood and Urine from a Human Case of Cryptococcosis (Torulosis)," *Proc. Soc. Exper. Biol. and Med.*, 77:775, 1951.
- 7 Greening, R. R. and Menville, L. J.: "Roentgen Findings in Torulosis: Report of 4 Cases," *Radiology*, 48:381, 1947.
- 8 Carton, C. A.: "Treatment of C.N.S. Cryptococcosis: A Review and Report of Four Cases Treated with Actidione," *Ann. Int. Med.*, 37:123, 1952.
- 9 Dormer, B. A., Friedlander, J., Wiles, F. J. and Simson, F. W.: "Tumor of the Lung Due to *Cryptococcus Histolyticus* (Blastomycosis)," *J. Thoracic Surg.*, 14: 322, 1945.
- 10 Froio, G. F. and Bailey, C. P.: "Pulmonary Cryptococcosis: Report of a Case with Surgical Cure," *Dis. Chest*, 16:354, 1949.
- 11 McConchie, I.: "Torula Granuloma of the Lung," *M. J. Australia*, 2:685, 1951.
- 12 Palmrose, E. C. and Losli, E. J.: "Cryptococcosis Meningitis: Report of Two Cases," *Northwest Med.*, 51:121, 1952.
- 13 Berk, M. and Gerstl, B.: "Torulosis (Cryptococcosis) Producing a Solitary Pulmonary Lesion," *J.A.M.A.*, 149:1310, 1952.
- 14 Poppe, J. K.: "Cryptococcosis of the Lung," *J. Thoracic Surg.*, 27:608, 1954.
- 15 Corpe, R. F. and Parr, L. H.: "Pulmonary Torulosis Complicating Pulmonary Tuberculosis Treated by Resection," *J. Thoracic Surg.*, 27:392, 1954.
- 16 Baker, R. D.: "Resectable Mycotic Lesions and Acutely Fatal Mycoses," *J.A.M.A.*, 150:1579, 1952.
- 17 Morson, W. G.: Personal Communication.

A New Type of Slotted Bronchoscope

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Washington, D. C.

In 1896 G. Killian¹ constructed and devised a series of endoscopic instruments which are the precursors of the present day bronchoscopic equipment. The bronchoscope which is used universally today is the 1915 Chevalier Jackson modification of the Killian bronchoscope.¹

Hill in 1909¹ introduced the idea of a slot in the standard laryngoscope which is covered by a removable spatula, this was made to facilitate instrumentation. At the same time he devised a slotted esophagoscope for the same purpose.

Frenkner in 1934¹ described several instruments for endobronchial catheterization and for bronchspirometry. Among the instruments he described is a bronchoscope with an optical system similar to a cystoscope and a side lumen with a slide and slot to facilitate introduction and manipulation into position of urethral catheters for the purpose of gas sampling. The slide is removed once the catheter is in place and the bronchoscope is removed without dislodging the catheter.

In 1952^{1, 2, 3} a slotted bronchoscope* was described (Fig. 1) resembling the Hill esophagoscope. This bronchoscope had a wide slot along its whole length. It was primarily used to facilitate the introduction of endobronchial blockers and removal of the bronchoscope for the control of secretions during anesthesia. It was later found that the slot along the whole length of the bronchoscope presented certain advantages during routine bronchoscopy. A modified bronchoscope was then devised which has features similar to the Sill and Jackson laryngoscopes and at the same time incorporates features of Frenkner's bronchoscope for bronchspirometry.

The new type of slotted bronchoscope** is a modified Chevalier Jackson instrument with a slot along its whole length (Fig. 2). There are two interchangeable slides. A long slide which converts the slotted bronchoscope into a standard type (Fig. 3) and a short slide which covers approximately two thirds of the length of the slot (Fig. 4), leaving the distal one third open. The slides can be removed and interchanged while the bronchoscope is in the tracheobronchial tree. These slides were found necessary in order to protect the teeth when the bronchoscope is rotated 360 degrees, at the same time it keeps out the soft tissues in the oral cavity to fall inside the lumen of the bronchoscope and obstruct the visual field.

For the past three years this type of slotted bronchoscope has been routinely used at the George Washington University Hospital. Careful evalu-

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*The Albert slotted bronchoscope manufactured by Foregger, New York.

**The modified Albert slotted bronchoscope manufactured by Pilling and Sons, Philadelphia, Pa.

ation of the advantages have been made and are listed under various headings.

Increased Visual Field: With the long slide in place a visual field is measured on ordinary graph paper. The slide is gently withdrawn until a point of maximal gain in the visual field has been reached. At this point measurements were made and the length of the short slide was determined. This is approximately two thirds the length of the bronchoscope. With the short slide in place, the visual field is increased by 50-60 per cent.

When the bronchoscope is introduced with the short slide in place, the whole area of the larynx is visualized. Once within the tracheal tree, the bronchoscope is rotated 360 degrees and the entire tracheal wall can be scanned rapidly.

Since the visual field is so markedly increased, one may use bronchoscopes with smaller lumens which cause less trauma to the vocal cords, the trachea and bronchi. Moreover being of a smaller diameter it can be introduced further along the tracheobronchial tree. The instrument presently used on all adults is 7 mm. in diameter and 45 cm. long

Better Oxygen Distribution: The slides have oxygen inlets. When the bronchoscope is introduced to distal portions of the tracheobronchial tree

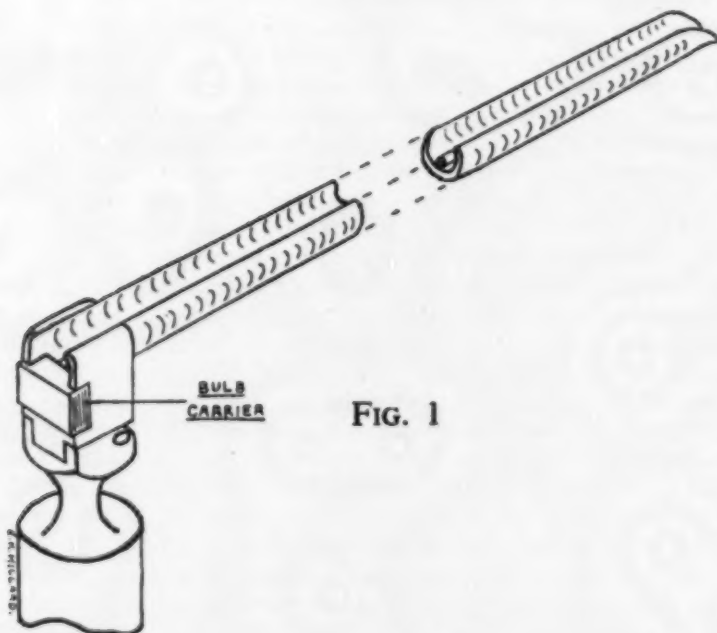


FIG. 1

FIGURE 1: The Albert slotted bronchoscope for introducing bronchial blockers.

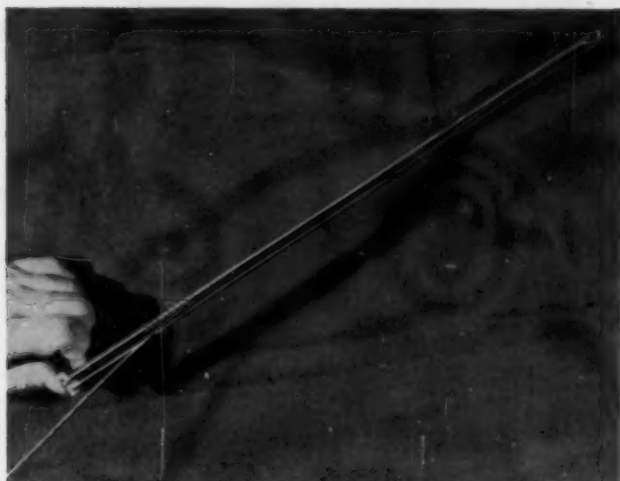


FIG. 2



FIG. 3



FIG. 4

Figure 2: The modified Albert slotted bronchoscope.—*Figure 3:* Long slide in place, converts the bronchoscope to a regular type Jackson bronchoscope.—*Figure 4:* Short slide in place leaving distal one-third of slot open.

a portion of the open slot remains above the carina level and oxygen flows freely to the opposite lung. This is particularly important when performing bronchoscopy on poor risk patients with little vital reserve.

Instrumentation: Ordinarily, when biopsy forceps or tampons are introduced through a bronchoscope, the operator has to move his head aside in order to allow passage for the instrument. Quite often the whole visual field is obstructed. With the slotted bronchoscope, the slide is removed and the instruments are introduced at an angle through the slot and the whole area is kept under direct vision throughout the procedure.

Removal of Foreign Bodies: Often one encounters foreign bodies that are larger than the lumen of the bronchoscope. In these cases the bronchoscope, the forceps and the foreign body are removed together. With the slotted bronchoscope the foreign body can be manipulated so it will slide into the slot and be withdrawn. At times the foreign body can be manipulated outside the lumen of the bronchoscope and withdrawn without having to remove the bronchoscope at the same time. This avoids repeated reinsertion of the instrument.

Acknowledgment: I am greatly indebted to the various members of the staff of the George Washington University Hospital—Dr. Brian Blades, Professor of Surgery and Dr. O. Gwathmey for determining and evaluating the advantages of the bronchoscope presented. Dr. Charles S. Coakley Professor of Anesthesiology for his suggestions in developing the slides for the slotted bronchoscope.

REFERENCES

- 1 Mushin, W. and Rendell-Baker, L.: *The Principles of Thoracic Anesthesia—Past and Present*, Blackwell Scientific Publications, Oxford, 1953.
- 2 Albert, S. N.: "A Slotted Bronchoscope for the Introduction of Bronchial Blockers," *Brit. J. Anesth.*, 24:145, 1953.
- 3 Albert, S. N.: "Anesthesia for Pulmonary Partial Resection," *Anesthesia and Analgesia*, 31:217, 1952.

Case Report Section

Bronchogenic Carcinoma with Breakdown of Primary and Metastatic Foci in the Lungs

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Cavity formation in metastatic nodules in the lung appears to be a rare phenomenon. There have been few reports of this condition published. The seventh case¹ was reported in 1955 and we believe ours is the eighth. Minor² indicated four cases of metastatic lesions in the lung with breakdown. However, there was only one primary site identified and that was a medullary carcinoma of the bladder. Salzman, et al,³ reported the primary in their two cases to be a seminoma of the testes and a primary in the pancreas. Katzen et al,¹ identified the primary in their case as an adenocarcinoma of the large bowel. In our case, the primary lesion was bronchogenic carcinoma in the left upper lobe bronchus. Apparently this is the first report of metastatic breakdown secondary to this condition.

Case Report

F. M., Number 6581-55, a 58 year old Puerto Rican man, was admitted to Metropolitan Hospital on June 15, 1955, with the chief complaints of cough productive of blood for one year, pain in the left shoulder and left arm, hoarseness, anorexia, weakness and 50 pound weight loss over the past six months.

He had persistent cough productive of greenish phlegm; occasionally during the past year this had been almost continuous during the day and had on occasion been cherry colored. About six months ago, a constant needle-like pain developed in the left shoulder. This radiated to the left arm and down into the hand and fingers. It also radiated upwards into the neck and was aggravated by motion of the neck. In this same period of time he also had almost constant hoarseness and "sore throat." He felt weak, lost his appetite and lost 50 pounds in weight. He was hospitalized in December, 1954, because of a small "lump" on the left side of the neck. At this time a biopsy was done and the report was: Carcinoma, probably pulmonary in nature." He smoked one-half pack of cigarettes daily.

Physical examination revealed a gaunt, emaciated, cooperative, hoarse white man in moderate respiratory distress. His temperature was 98° F., pulse 125, respiration 35. Weight 100 pounds, and blood pressure 130/70. His skin was dry, and hung loosely in folds.

There was some limitation of movement of the neck to the left side. The trachea was deviated to the left and there was tenderness on pressure over cervical vertebra. In the left supraclavicular area there was a hard, non-tender, fixed mass about 4 x 2 cms. in size with a linear scar on its upper surface.

There were some small discrete nodes palpated in both axillae. The chest appeared emphysematous. There was dullness to percussion over the left upper and the right lower lung fields. Scattered rhonchi were audible bilaterally, anteriorly and in the upper lung field posteriorly.

The liver was enlarged three fingers breadth below the costal margin. There were small discrete nodes in the left inguinal region.

From the Medical Service of Dr. Linn J. Boyd, Metropolitan Hospital.

The extremities showed marked muscular wasting and moderate clubbing of the fingers bilaterally. The urine was negative except for a trace of albumen. The electrocardiogram showed low voltage in Lead I. Low T_I, High P₂ and P₃. Indirect laryngoscopy revealed paralysis of the left vocal cord.

X-ray film of the chest on June 16, 1956 (Fig. 1), revealed evidence of a large cavity occupying the left upper lung field with many nodular areas with central highlight in this lung. In addition to numerous nodules with and without highlights, there was a large mass in the right lower lung field with a large cavity and fluid level.

He expired one week after admission. At necropsy the combined weight of the lungs was 1400 gms.; the interlobar fissures were obliterated on both sides by firm adhesions. On the visceral pleural surfaces there were scattered neoplastic foci, varying in diameter between a few millimeters and 1.8 cms.; many showed umbilication. On sectioning, the parenchyma of both lungs showed multiple neoplastic foci scattered thruout the congested, edematous, partly atelectatic lung tissue. All these intrapulmonary tumors were of the size as those noted on the visceral pleural surfaces; many showed some umbilication. In the lower lobe of the right lung, however, there was an obviously neoplastic irregularly round mass, 5 cms. in its greatest diameter; the center of this

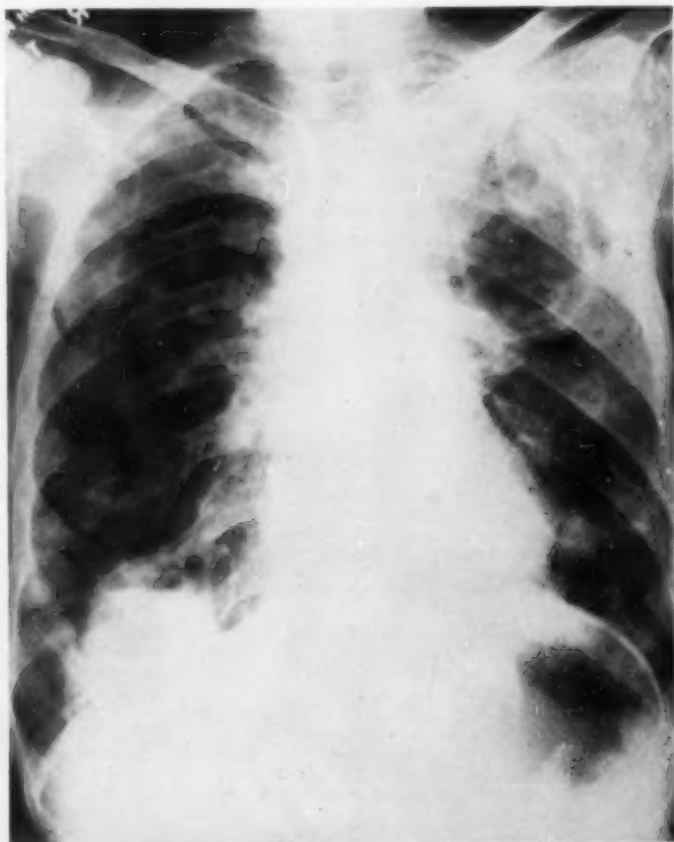


FIGURE 1: X-ray of June 16, 1956, shows multiple metastases of both lungs with many nodules showing central highlight. There is a large cavity in the left upper lung field (breakdown of the primary bronchogenic neoplasm) and a large mass with cavity and fluid level in the right base (breakdown of a large metastatic focus).

mass consisted of friable grossly amorphous necrotic tissue, definitely not purulent. It was possible to determine that the primary tumor had arisen from the bronchus to the upper lobe of the right lung, just distal to its origin; this primary neoplasm had grown to an infiltrating mass with a maximum diameter of 7 cms., and here also extensive necrosis had resulted in a central area of cavitation fully 4 cms. in diameter: the contents of this cavity grossly resembled the material already described in the large metastatic mass in the right lower lobe. There were gross metastases to mediastinal, hilar and peritracheal lymph nodes and to the parietal pleura on the left side. Extension of the neoplasm to the pericardium and myocardium on the left side was noted.

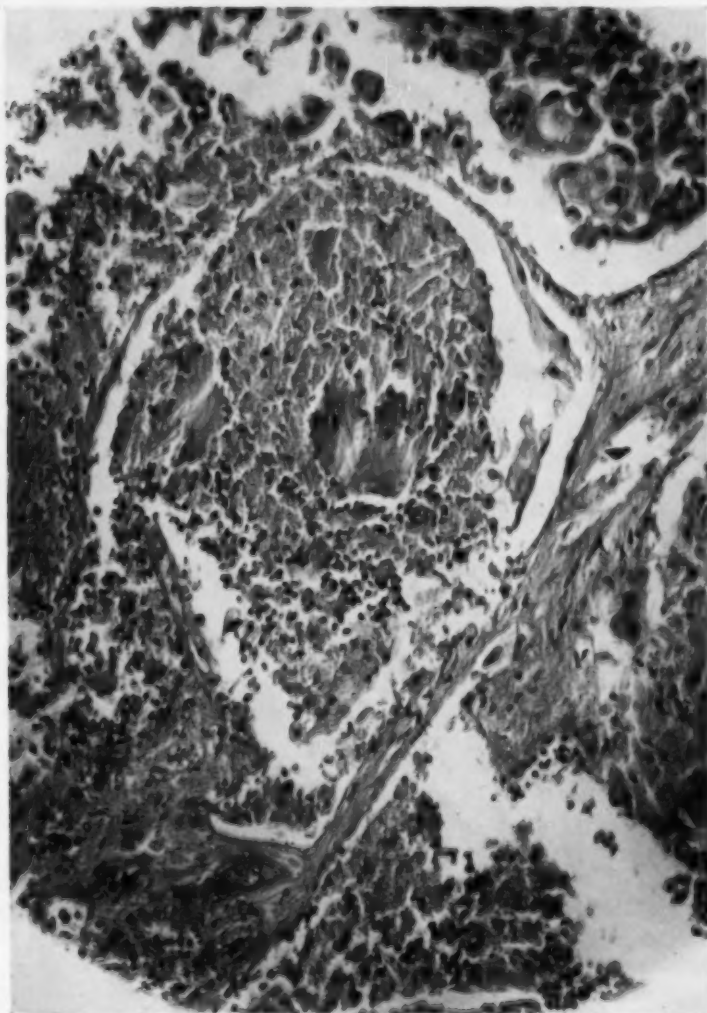


FIGURE 2: Figure 2 shows epidermoid carcinoma at the periphery with central necrosis and the presence of polymorphonuclear cells and lymphocytes.

Incidental findings elsewhere in the body were a penetrating peptic ulcer, 3 cms. in diameter in the prepyloric area of the stomach, and an unruptured aneurysm of the abdominal aorta 5 cms. in length.

Microscopic examination showed bronchogenic carcinoma, mainly epidermoid in histologic structure. The cavitations noted at autopsy showed well preserved epidermoid carcinoma at the periphery, surrounding structureless necrotic material wherein here and there small islands still preserved recognizable characteristic of epidermoid carcinoma. Most of the fields showed no evidence of inflammatory cellular reaction; occasionally polymorphonuclear cells and lymphocytes were detected in small numbers (Fig. 2). This histologic picture we interpret as due to ischemic necrosis.

COMMENT

Cavity formation in primary disease of the lung is common. Cavity formation occurs in lung abscesses, tuberculosis, silicosis, etc. Several reports have called attention to the frequency of necrosis and cavity formation in primary bronchogenic carcinoma. Hauser and Wolpaw⁴ observed a frequency of breakdown of primary carcinoma of the lung in 12 per cent. Rosedale and Mackay⁵ reported almost 50 per cent. Koletsky⁶ saw cavitation more than 4 cms. in diameter in 30 per cent of their 51 cases. It would seem from these reports that the average incidence of breakdown in primary carcinoma of the lung is approximately 30 per cent.

Even though bronchogenic carcinoma of the lung is so prevalent, the incidence of secondary pulmonary metastases is undoubtedly as high or higher than primary neoplasm of the lung. Willis⁸ concludes that blood borne pulmonary metastases occur in approximately the following percentages: oral and pharyngeal carcinoma—30, carcinoma of the oesophagus—20, of stomach—20, intestines—15, liver—20, pancreas—20, breast—55, uterus—15, ovary—10, prostate—40, thyroid—65, kidney—75, malignant melanoma—75, osteosarcoma—75, and chorionic epithelioma—75. In his own series of 500 necropsies, Willis,⁸ found primary metastases in 29 per cent of the cases. And yet, in spite of this high incidence of metastases, we have virtually no cavity formation in secondary metastatic foci.

Tumors depend for their survival upon the blood supply of the host, furnished through the stroma of the tumor. As tumors grow, the center of the growth becomes more and more removed from this food supply and so suffers necrosis. Degeneration of tumors is a common phenomenon, varying directly with the size of the mass, i.e.: the larger the mass the higher the incidence of degeneration. The lung is a very vascular structure, extremely rich with its dual blood supply, and hence offers excellent opportunity for the survival of even large tumors, though microscopic evidence of necrosis is occasionally present.

In view of the excellent terrain for tumor's growth, why do primary tumors cavitate? Here is an added factor which is not present in metastatic tumors. In primary neoplasm, the bronchus to the diseased area is almost always involved and frequently completely occluded. As a result of this, superimposed pyogenic infection is extremely common and is responsible for the frequent appearance of cavity formation.

In metastatic neoplasm the bronchus to the tumor mass is uninvolved and the favoring infection is not present. Consequently breakdown second-

dary to infection almost never occurs. We believe that breakdown of metastatic foci is so rare because these same foci almost never interfere sufficiently with the dual blood supply to cause sufficient destruction and subsequent cavity formation.

REFERENCES

- 1 Katzen, H. and Bass, H.: "Cavitation in Metastatic Pulmonary Neoplasm," *Dis. Chest*, 27:225, 1955.
- 2 Minor, G. R.: "A Clinical and Radiological Study of Pulmonary Neoplasms," *J. Thoracic Surg.*, 20:34, 1950.
- 3 Salzman, E., Reid, J. H. and Ogura, G. I.: "Cavernous Metastatic Pulmonary Carcinoma: A Report of Two Cases," *Dis. Chest*, 23:678, 1953.
- 4 Hauser, H. and Wolpaw, S. E.: "Cavitary Bronchogenic Carcinoma," *Radiology*, 34:698, 1940.
- 5 Rosedale, M. and McKay, D. R.: "A Study of 57 Cases of Bronchogenic Carcinoma," *Amer. J. Cancer*, 26:493, 1936.
- 6 Koletsky, S.: "Primary Carcinoma of the Lung: A Clinical and Pathological Study of 100 Cases," *Arch. Int. Med.*, 62:636, 1938.
- 7 Fishberg, M. and Rubin, E. H.: "Carcinomatous Abscess of the Lung," *Am. J. M. Sc.*, 178:20, 1929.
- 8 Willis, R. A.: *The Spread of Tumors in the Human Body*, Butterworth and Co., Ltd., 1952.



Professor Attilio Omodei Zorini

INTERNATIONAL COLLEGE MEDAL PRESENTED TO PROFESSOR ATTILIO OMODEI ZORINI

Professor Zorini, Medical Director of the world renowned Carlo Forlanini Institute, Rome, Italy, and pioneer in the advancement of the treatment of tuberculosis in his country, as well as throughout the world, was presented the 1956 International College Medal of the American College of Chest Physicians at the time of the Fourth International Congress on Diseases of the Chest held in Cologne, Germany, August 19-23. The presentation was made by Dr. Herman J. Moersch, Rochester, Minnesota, President of the College, at the Inaugural Ceremonies of the Congress held on Sunday, August 19 in the splendid new Halle VIII of the Messehalle of the City of Cologne, headquarters for the International Congress.

Professor Zorini attended the University of Turin, receiving his medical degree in 1920. During the years from 1921 to 1928, Professor Zorini served as assistant to Professor Vanzetti and, later, Professor Morelli, from whom he obtained great knowledge in the field of pathology of tuberculosis and other chest diseases. In 1928, when still a very young man, Professor Zorini was appointed Assistant Director of the Institute Porta Furba in Rome, where he remained until 1934. He was then appointed Assistant Director of the Carlo Forlanini Institute, which was founded and directed by Professor Eugenio Morelli. Together, they have developed the Institute into a world center for the study of tuberculosis.

Many important studies were undertaken by Professor Zorini at the Carlo Forlanini Institute which led to the solution of fundamental problems in the diagnosis and treatment of tuberculosis. He was placed in charge of the teaching of phthiology at the University of Naples in 1936 and in 1939 founded and directed the 1600-bed Principi di Piemonte Sanatorium in that city. Upon the unanimous vote of the Medical Faculty of the University of Naples, in 1940 Professor Zorini was appointed to the Chair of Phthiology of the University.

Professor Zorini was appointed Medical Director of the Carlo Forlanini Institute in 1945 by Professor Morelli, the National Institute of Social Welfare and the Medical Faculty of Rome, and four years later he also assumed charge of the Rome Phthiological Clinic and of all of the courses in phthiology. In 1952, Professor Zorini was given the Chair of Phthiology at the University of Rome. In addition to these important offices and his teaching duties at the University of Naples, Professor Zorini carried on many original research investigations, lectured in countries throughout the world and received physicians from all countries for study of the investigations and procedures carried out at the Institute. It would not be possible to list all of the important investigations and the more than 400 publications of Professor Zorini, his associates and pupils.

A Fellow of the American College of Chest Physicians, Professor Zorini serves as Regent of the College for Italy and as Chairman of the Council on European Affairs. He is Vice-President of the Italian Federation Against Tuberculosis, a member of the Executive Committee of the International Union Against Tuberculosis, and an honorary member of numerous tuberculosis societies in Europe and the Americas. Professor Zorini is particularly distinguished for having organized the First International Congress on Diseases of the Chest, sponsored by the American College of Chest Physicians, which was held in Rome in 1950. He also participated in the International Congresses of the College held in Rio de Janeiro, Brazil, 1952 and Barcelona, Spain, in 1954, and was invited to lecture in these countries.

It is indeed an honor for the American College of Chest Physicians to present this great scientist with the Fourth International Medal for meritorious achievement in diseases of the chest.

FOURTH INTERNATIONAL CONGRESS ON DISEASES OF THE CHEST

Cologne, Germany, was host to the Fourth International Congress on Diseases of the Chest, sponsored by the Council on International Affairs, American College of Chest Physicians, held August 19 through 23, 1956. The Congress was presented under the Patronage of the Federal Government of West Germany with Chancellor Konrad Adenauer as the Honorary President. The Officers of the Congress were: President, Professor Gerhard Domagk, Wuppertal-Elberfeld, Nobel Prize Winner; Vice President, Professor H. W. Knipping, Cologne; Secretary General, Professor Josef Jacobi, Hamburg; and Chairman of the Executive Committee, Professor Joachim Hein, Schleswig-Holstein. The other members of the Executive Committee were:

Dr. Otto Buurman, Director
Department of Health
Ministry of the Interior

Prof. Ludwig Heilmeyer
Governor for Freiburg

Prof. Rudolf Schoen
Governor for Göttingen

Prof. Walter Unverricht
Governor for West Berlin

Dr. Max Adenauer, Director
City of Cologne

Prof. Ernst Wollheim
Governor for Wurzberg

Prof. Hans Wurm
Governor for Wiesbaden

Prof. Rudolf Zenker
Governor for Marburg

Some of the members of the Executive Committee who had the responsibility of organizing the Congress, are shown in the photograph below.

The Congress required two years of planning and numerous conferences and committee meetings were held during this period. Professors Hein and Jacobi made many trips to Cologne and Bonn to attend these conferences. Professor Knipping and his efficient staff at the Clinic, devoted a great portion of their time to arrangements for the Congress. Mr. Kornfeld, the Executive Director of the College, met with the members of the Executive Committee and with government officials in Germany during the organizational stages of the Congress.



Seated, left to right: Prof. Josef Jacobi, Prof. Joachim Hein, Prof. H. W. Knipping; Standing, left to right: Prof. Rudolf Schoen, Prof. Ernst Wollheim, Mr. Murray Kornfeld, and Prof. Ludwig Heilmeyer.

The contributions to the Congress by the members of the Executive Committee and their associates, are gratefully acknowledged by the officers and members of the American College of Chest Physicians.

Inaugural Ceremony

The Congress was officially opened at an inaugural ceremony held on Sunday evening, August 19, in the beautiful Halle VIII of the Messehalle, which served as the headquarters of the Congress. Representatives of the West German Federal Government, the State of Nordrhein-Westfalen and the City of Cologne; dignitaries representing the embassies and consulates of other countries; and prominent scientists from various medical schools throughout Germany, were present for this important and impressive ceremony. A large contingent of the Board of Regents and Board of Governors was in attendance.

Professor Joachim Hein, Regent of the College for Germany, presided at the inaugural ceremony and introduced the attending dignitaries. He opened the ceremony with words of welcome to all who had come from many distant lands. Brief welcoming addresses were then delivered by Dr. Ernst Schwering, the Mayor of the City of Cologne, and by Professor D. Oberländer, representing the German Federal Government.

Professor Gerhard Domagk, the President of the Congress, was introduced and professed his extreme pleasure in having the opportunity to address the international gathering. His talk dealt with the advancements made in the treatment of diseases of the chest.



Schleiss, Cologne

Dr. Herman J. Moersch, Rochester, Minnesota, USA, President, American College of Chest Physicians (left), and Prof. Gerhard Domagk, Wuppertal-Elberfeld, Germany, President, Fourth International Congress on Diseases of the Chest (right), photographed during the Inaugural Ceremony.

During an intermission, the Cologne Symphony Orchestra, under the direction of Professor Günter Wand, played the Lenore Overture, which was received with a great ovation. Professor Hein introduced the President of the American College of Chest Physicians, Dr. Herman J. Moersch, of the Mayo Clinic, Rochester, Minnesota. Dr. Moersch made the following remarks:

"On behalf of the American College of Chest Physicians, I wish to thank you for your patronage and presence. It is with great pleasure that we participate in this, the Fourth International Congress on Diseases of the Chest. We are indeed grateful to you and your associates for the warm welcome that has been extended to us and are looking forward with pleasure to an outstanding Congress.

"Germany has long occupied an honored position in the field of medicine and has contributed greatly to medical advancement. The high standards of Germany's medical meetings are well known throughout the world, and I am certain that this meeting will prove no exception. It is our hope that it will prove fruitful to all those in attendance. We anticipate that the exchange of information and ideas that we are about to enjoy will not only prove of benefit to mankind but also lead to a greater peace, which is so necessary to a full and happy life.

"I now wish to read the following telegram from the President of the United States of America:

"Please accept my warm best wishes for the success of the Fourth International Congress on Diseases of the Chest. I congratulate you and your fellow delegates on your dedication to the conquest of chest diseases and on your contribution to public health programs. May your future services to mankind be as noteworthy as those of the past.

Dwight D. Eisenhower"

Dr. Moersch then awarded to Professor A. Omodei Zorini, Medical Director, Carlo Forlanini Institute, Rome, Regent of the College for Italy, the International College Medal for meritorious achievement in diseases of the chest.



Wiesemann, Düsseldorf

Inaugural Ceremony, Sunday, August 19, 1956, New Hall VIII, Messehalle.

Dr. John F. Briggs, St. Paul, Minnesota, Chairman of the Board of Regents of the College, presented testimonial plaques in recognition and appreciation of their distinguished services to the Congress, to the following officials:

Dr. Otto Buurman, Director, Department of Health, Ministry of the Interior, Germany

Dr. Ernst Schwering, Mayor, City of Cologne

Dr. Max Adenauer, Director, City of Cologne

Prof. Hugo W. Knipping, Vice President of the Congress

Prof. Josef Jacobi, Secretary-General of the Congress

Prof. Joachim Hein, Chairman, Executive Committee for the Congress

Professor Gerhard Domagk, President of the Fourth International Congress and Nobel Prize Winner, was awarded an Honorary Fellowship in the American College of Chest Physicians.

Professor Domagk then presented certificates of merit from the Executive Committee of the Congress to Dr. Herman J. Moersch, President, Dr. Andrew L. Banyai, Chairman, Council on International Affairs, and Mr. Murray Kornfeld, Executive Director, American College of Chest Physicians, for their valuable contributions to the success of the Fourth International Congress on Diseases of the Chest.

The inaugural ceremony closed with a request number by the Cologne Symphony Orchestra.



Schleiss

Dr. Max Adenauer, Director, City of Cologne, receiving certificate of merit from Dr. John F. Briggs, St. Paul, Minnesota, USA, Chairman, Board of Regents, American College of Chest Physicians, at the Inaugural Ceremony of the Congress.

Scientific Sessions

The scientific papers and panel discussions were presented in three separate halls at the Messehalle, the program beginning at 9:00 a.m. each day of the Congress and continuing until 5:00 p.m., with the hours between noon and 2:00 p.m. open for luncheon and visiting the many splendid exhibits.

The main themes presented at the Congress were Coronary Diseases, Industrial Diseases of the Chest, Chemotherapy in Tuberculosis, Pulmonary Function, Cardiac Function and Tumors of the Mediastinum. Following the close of the formal presentation of these themes, the subjects were further discussed by panels comprised of specialists in their respective fields. Panel discussions were first introduced by the College at the Congress in Barcelona, Spain, in 1954 and were repeated at the Cologne Congress by popular request. In addition, there were sessions covering many other subjects in the field of diseases of the chest.



Wiesemann

Two of the many Fireside Conferences; upper photograph, Prof. Etienne Bernard, Paris (Center); lower photograph, Prof. Vincenzo Monaldi, Naples (Center), Discussion Leaders.

An innovation at the Cologne Congress were the Fireside Conferences which were presented each afternoon at the close of the regular scientific assembly. These conferences were also received with much enthusiasm and will become an integral part of the future international congresses of the College. The Fireside Conferences afford the physicians a splendid opportunity to become acquainted with their colleagues from many parts of the world and enable them to express their views in informal discussion.

The scientific sessions presented in the assembly halls were translated simultaneously, with the use of headphones, into the official languages of the Congress, namely, German, French, Spanish and English.

Recent advances in the medical and surgical treatment of chest diseases were presented in the motion picture sessions of the Congress. A special program containing 583 pages of abstracts of the scientific papers, translated into the four official languages of the Congress, was available for purchase.

The commercial exhibits filled Halls V and VI of the Messehalle where many excellent displays were presented by the leading European pharmaceutical and medical supply houses. There were also splendid exhibitions by the medical book publishers of Europe.

Professor Werner Forssmann of Bad Kreuznach, Germany, Nobel Prize winner, was introduced at the Congress by Dr. Herman J. Moersch, President of the College, and received a standing ovation.

Executive Sessions

The Council on International Affairs of the College held two executive sessions during the Fourth International Congress on Diseases of the Chest. The first executive session was held on Sunday afternoon, August 19, in the Western Congress Hall of the headquarters building. Dr. Herman J. Moersch, President of the College, presided at the session and introduced the President of the Congress, Professor Domagk, the Vice President, Professor Knipping, the Secretary-General, Professor Jacobi, and Professor Hein and the members of his Executive Committee.



Scientific Sessions; one of the five panel discussions.

Wiesemann

The following reports were presented:

- Report of the Committee on Arrangements for the Congress
Joachim Hein, Toensheide, Holstein, Germany, Chairman
- Report of the Council on International Affairs
Andrew L. Banyai, Milwaukee, Wisconsin, USA, Chairman
- Report of the Council on Pan American Affairs
 - South America and the Caribbean
Jose Ignacio Baldo, Caracas, Venezuela, Chairman
 - North and Central America
John F. Briggs, St. Paul, Minnesota, USA, Chairman, Board of Regents
- Report of the Council on European Affairs
Attilio Omodei Zorini, Rome, Italy, Chairman
- Report of the Council on African and Eastern Affairs
David P. Marais, Cape Town, South Africa, Chairman
Presented by Robert H. Goetz, Cape Town, South Africa
- Report of the Council on Pan Pacific Affairs
Miguel Canizares, Quezon City, Philippines, Chairman
Presented by Laureano Bautista, Quezon City, Philippines
- Report of the Committee on Resident Fellowships
Richard R. Trail, London, England
- Report of the Committee on Motion Pictures
Paul H. Holinger, Chicago, Illinois, USA, Chairman
- Report of the Committee on Membership
Chevalier L. Jackson, Philadelphia, Pennsylvania, USA, Chairman
- Report of the Executive Director
Murray Kornfeld, Chicago, Illinois, USA
- Awarding of Fellowship Certificates
Herman J. Moersch, Rochester, Minnesota, USA, President

The closing executive session was held on the afternoon of Thursday, August 23, in the Western Congress Hall with Dr. Moersch presiding, and the following reports were received:

- Report of the Committee on College Essay
H. Allan Novack, Boston, Massachusetts, USA
- Report of the Editorial Board, *Diseases of the Chest*
J. Arthur Myers, Minneapolis, Minnesota, USA, Chairman
- Reports on College Books
 - Nontuberculous Diseases of the Chest
Andrew L. Banyai, Milwaukee, Wisconsin, USA, Editor
 - Progress in Thoracic and Cardiac Surgery
Alfred Goldman, Los Angeles, California, USA, Editor
 - Clinical Cardiopulmonary Physiology
Burgess L. Gordon, Philadelphia, Pennsylvania, USA, Editor
 - Roentgenology of the Chest
Coleman B. Rabin, New York City, USA, Editor
- Report of the Committee on Nominations
Harold G. Trimble, Oakland, California, USA, Chairman
 - H. W. Knipping, Cologne, Germany
 - Jose Ignacio Baldo, Caracas, Venezuela
 - Li Shu-Fan, Hong Kong, China
 - Papken S. Mugrditchian, Beirut, Lebanon
- Announcement of the 1958 Congress
Murray Kornfeld, Chicago, Illinois, USA, Executive Director
- Closing Remarks
Herman J. Moersch, Rochester, Minnesota, USA, President

At both the opening and closing executive sessions, the national flags of various countries were presented to the College by officials from those countries. This procedure was initiated by the Cuban Chapter of the College at the annual meeting held in Chicago, Illinois in June 1956, when the Cuban National Flag was presented at the annual Convocation. The following national flags were received, with proper ceremony, at the executive sessions in Cologne:

Argentina	Paraguay
Austria	Peru
Ceylon	Philippines
Denmark	Portugal
Germany	South Korea
Italy	Switzerland
Japan	Union of South Africa
Mexico	Uruguay
Pakistan	Venezuela

The College is proud to have these flags, representing its members in countries throughout the world. A special platform has been constructed in the College building in Chicago where the flags have been placed for permanent display.

The following letter received from Prime Minister Ichiro Hatoyama of Japan, was read:

"Professor Andrew L. Banyai,
Chairman of Council on International Affairs,
American College of Chest Physicians.

Dear Professor Banyai:

"Being fully cognizant of the significance and gravity of the brilliant achievement attained by your American College of Chest Physicians, as well as of the inestimable values of the scientific contributions brought together and attested at the past three sessions of the International Congress on Diseases of the Chest held under the sponsorship of your famed organization, I have the honor to pay my profound respect and high tribute of admiration to the Officers of your College and of your Council on International Affairs for your zealous devotion in promoting the lofty cause and movement of your College and thereby in furthering immensely the welfare of human beings.

"It is with great enthusiasm and pleasure that I have the honor of inviting, in the name of the Japanese Government, the 5th International Congress on Diseases of the Chest to Tokyo. This official invitation of my Government is endorsed by all members of the Japanese Chapter of the College in Tokyo and six other areas in Japan.

"As you are well aware, the climate and various conditions of human life in Japan and other Asian countries have unique features, characteristic of the Orient, and they are widely different from those in other parts of the Pan-Pacific Area. It is natural, therefore, that peculiar aspects and symptoms of various chest diseases and many cases of scientific curiosity which can hardly be found in Pan-American and European countries exist in the Far East, and offer the specialists many new themes in the field of medical researches. I am firmly convinced that to inspect and study them, to discuss them and to find out their practical remedies is not only very significant in itself, but will add all the more to the value of your College's achievement.

"It is our fervent hope that you would be so good as to place this invitation of my administration for deliberation at the Executive Committee Session of your Council on International Affairs and be given your favorable consideration. All members of the Japanese Chapter of the College and myself will be extremely grateful to you if you would kindly see your way so that a decision will be made at the 4th Congress to be held in Cologne in August this year to the effect that the 5th Congress will be awarded to Tokyo.

Sincerely,

Ichiro Hatoyama
Prime Minister of Japan"

It was announced by the Executive Director of the College, Mr. Murray Kornfeld, that at a meeting of the Executive Council held in Cologne on Wednesday, August 22, the following resolution was unanimously adopted:

WHEREAS four international congresses on diseases of the chest have been held in the Western Hemisphere, and

WHEREAS our Eastern chapters have been eager to have a congress held in their part of the world, and

WHEREAS a congress in the East would enable College members to meet personally some of the leading physicians in the Eastern countries, and would do much to promote friendship and understanding among the peoples of the East and West, and

WHEREAS it would be possible to visit a great many of the College chapters en route to the East from either Europe or the Americas, and

WHEREAS it has been definitely determined that there are adequate facilities in Tokyo for a congress, and

WHEREAS the Japanese Government has extended an invitation to the American College of Chest Physicians to hold the Fifth International Congress on Diseases of the Chest in Tokyo in 1958,

BE IT THEREFORE RESOLVED that this invitation be accepted and that the Governor and Regent for the College in Japan be notified accordingly.

Dr. Yoneji Miyagawa, Professor Emeritus of the Tokyo University, Director of the Tosei Hospital, and President of the Japanese Chapter of the College, was introduced and pledged the support of the College Chapter and the medical associations of Japan in the organization of the Fifth International Congress on Diseases of the Chest to be held in Tokyo in 1958. Other members of the official Japanese Delegation to the Cologne Congress were Dr. Hiroshi Sasamoto, Assistant Professor of Medicine, Keio University, and Dr. Masao Tamaki, Professor of Radiology, Gifu University Hospital.

Letters were read which had been received from the Hon. William G. Stratton, Governor of the State of Illinois, and the Hon. Richard J. Daley, Mayor of the City of Chicago, Illinois, USA, the city and state wherein the College Headquarters Building is located. The letters read as follows:

"The State of Illinois is pleased to extend its best wishes for a successful meeting of the Fourth International Congress on Diseases of the Chest of the American College of Chest Physicians being held August 19-23, 1956, in Cologne, Germany.



Wiesemann

Dr. Moersch receiving the Venezuelan National Flag at the Executive Sessions. Eighteen national flags were presented at these sessions during the Congress.

Illinois is proud that the international headquarters of the American College of Chest Physicians is in the City of Chicago and that the first Chapter of the College was from this State. I am asking Otto L. Bettag, M.D., Director, Illinois Department of Public Welfare, and Regent of the American College of Chest Physicians, to extend my personal greetings to the Congress and to present Chancellor Konrad Adenauer, Honorary President of the Congress, with a token of esteem from the citizens of the State of Illinois.

William G. Stratton, Governor
State of Illinois"

"It is interesting to know that the American College of Chest Physicians will hold its Fourth International Congress in Cologne during August. The fact that Dr. Konrad Adenauer is Honorary President of the Congress gives it greater interest to Chicagoans because of his recent visit to this city, where we were happy to receive and honor him. Inasmuch as Chicago is the international headquarters of the American College of Chest Physicians, and one of the great medical centers of the world, I would very much appreciate it if you would extend our city's greetings to the Congress and our very best wishes for a most successful meeting.

Richard J. Daley, Mayor
City of Chicago"

The Committee on Nominations, under the chairmanship of Dr. Harold G. Trimble, USA, presented the following slate of officers for election, which was unanimously approved:

REGENTS

Honorary Regents

Brazil	Affonso MacDowell.....	Rio de Janeiro
Canada	William E. Ogden.....	Toronto
Greece	Nicholas Oekonomopoulos	Athens
Italy	Eugenio Morelli	Rome

Regents

Argentina	Gumersindo Sayago	Cordoba
Australia	W. Cotter Harvey.....	Sydney
Austria	Anton Sattler	Vienna
Belgium	Lucien Brull.....	Liege
Brazil	Manoel de Abreu.....	Rio de Janeiro
Canada	Thomas G. Heaton.....	Toronto
Chile	Hector Orrego Puelma.....	Santiago
China	Lu Shu-Fan	Hong Kong
Colombia	Carlos Arboleda Diaz.....	Bogota
Cuba	Antonio Navarrete	Havana
Ecuador	Juan Tanca Marengo.....	Guayaquil
England	Richard R. Trail.....	London
France	Etienne Bernard	Paris
Germany	Joachim Hein	Schleswig-Holstein
Greece	Basil N. Papanicolaou.....	Athens
India	Raman Viswanathan.....	New Delhi
Italy	A. Omodei Zorini.....	Rome
Japan	Jo Ono.....	Tokyo
Mexico	Donato G. Alarcon.....	Mexico City
Netherlands	L. D. Eerland.....	Groningen
Peru	Ovidio Garcia-Rosell	Lima
Philippine Islands	Miguel Canizares	Manila
Portugal	Lopo de Carvalho.....	Lisbon
South Africa	David P. Marais.....	Cape Town
Spain	Antonio Caralps	Barcelona
Sweden	Clarence Crafoord	Stockholm
Switzerland	Wilhelm Loeffler	Zurich
Turkey	Tevfik Saglam	Istanbul
Uruguay	Fernando D. Gomez.....	Montevideo
Venezuela	Jose Ignacio Baldo.....	Caracas

GOVERNORS

Honorary Governor

Italy Maurizio Ascoli Palermo

Governors

Argentina Raul F. Vaccarezza Buenos Aires

Australia

New South Wales G. Bruce White Sydney

South Australia Darcy R. W. Cowan Adelaide

Victoria Alan H. Penington Melbourne

Austria Erhard F. Kux Innsbruck

Belgium Henry Durieu Brussels

Brazil

Bahia Jose Silveira Salvador

Minas Gerais Orlando Cabral Motta Belo Horizonte

Para Epilogo de Campos Para

Rio de Janeiro Reginaldo Fernandes Rio de Janeiro

Rio Grande do Sul Carlos Bento Porto Alegre

Sao Paulo and Parana Euryclides de Jesus Zerbini Sao Paulo

Canada

British Columbia W. Elliott Harrison Vancouver

Eastern Provinces J. J. Quinlan Kentville, N.S.

Manitoba Lawrence R. Coke Winnipeg

Ontario Hugo T. Ewart Hamilton

Quebec B. Guy Begin Montreal

Western Provinces Leslie Mullen Calgary, Alberta

Ceylon

George E. Ranawake Colombo

Chile

Concepcion Ildefonso Garreton Unda Concepcion

Santiago Armando Alonso Vial Santiago

Valparaiso Gilberto V. Zamorano Valparaiso

China

Kenneth L. Hui Hong Kong

Colombia

Rafael J. Mejia Medellin

Costa Rica

Raul Blanco Cervantes San Jose

Cuba

Francisco J. Menendez Havana

Czechoslovakia

Jaroslav Jedlicka Prague

Denmark

Jens L. Hansen Copenhagen

Ecuador

Jorge A. Higgins Guayaquil

Egypt

Abdel-Aziz Sami Cairo

El Salvador

Jose Francisco Valiente San Salvador

England

Geoffrey Bourne London

Peter W. Edwards Shropshire

Sir Geoffrey Todd Midhurst

Sakari Mustakallio Helsinki

Finland**France**

Bordeaux F. Piechaud Bordeaux

Lyon Paul Santy Lyon

Nantes Paul Veran Nantes

Paris Maurice Bariety Paris

Paris Andre Meyer Paris

Germany	
Cologne	H. W. Knipping.....Cologne
Freiburg	Ludwig Heilmeyer.....Freiburg
Göttingen	Rudolf Schoen.....Göttingen
Hamburg	Josef Jacobi.....Hamburg
Marburg	Rudolf Zenker.....Marburg
West Berlin	Walter Unverricht.....West Berlin
Wiesbaden	Hans Wurm.....Wiesbaden
Würzburg	E. Wollheim.....Würzburg
Greece	Panayiotis Chortis.....Athens
Haiti	Louis Roy.....Port-au-Prince
Honduras	Ramon Larios.....Tegucigalpa
India	
Eastern India	P. K. Ghosh.....Calcutta
Northern India	K. L. Wig.....Punjab
Southern India	K. S. Sanjivi.....Madras
Western India	Prag Nath Kapur.....Delhi
Ireland	Victor M. Synge.....Dublin
Israel	Juda M. Pautzner.....Petach-Tikva
Italy	
Milan	Giuseppe Daddi.....Milan
Naples	Vincenzo Monaldi.....Naples
Palermo	Nicola Sanguigno.....Palermo
Rome	Giovanni L'Eltore.....Rome
Japan	Hidejiro Haruki.....Tokyo
Korea	Eung Soo Han.....Seoul
Lebanon	Papken S. Mugrditchian.....Beirut
Mexico	Miguel Jimenez-Sanchez.....Mexico
Netherlands	M. R. Heynsius van den Berg.....Amsterdam
Nicaragua	Rene Vargas.....Managua
Norway	Einar Murstad.....Lillehammer
Pakistan, East	Mohammed Ibrahim.....Dacca
Pakistan, West	Roeinton B. F. Khambatta.....Karachi
Panama	Augustin A. Sosa.....Panama City
Paraguay	Juan Max Boettner.....Asuncion
Peru	Maximo Espinoza Galarza.....Lima
Philippine Islands	Manuel Quisumbing, Sr.....San Pablo
Portugal	Carlos Alberto Vidal.....Lisbon
South Africa	
Northern States	Maurice A. Pringle.....Transvaal
Southern States	Theodore Schrire.....Cape Town
Spain	
Barcelona	Raimundo Frouchtman.....Barcelona
Bilbao	Carmelo Gil-Turner.....Bilbao
La Coruna	Alvaro Urgoiti.....La Coruna
Madrid	Jose Abello.....Madrid
Sweden	
Gothenburg	Gosta Birath.....Gothenburg
Malmo	Helge B. Wulff.....Malmo
Uppsala	Erik Hedvall.....Uppsala
Switzerland	
Central Switzerland	Alfred Brunner.....Zurich
West Switzerland	Maurice Gilbert.....Geneva
Turkey	Celal Ertug.....Ankara
Uruguay	Armando Sarno.....Montevideo
Venezuela	
Guarico Province	Julio Criollo Rivas.....Caracas
Zulia Province	Pedro Iturbe.....Maracaibo
Yugoslavia	Robert T. Neubauer.....Sezana

Congress Banquet

A gala banquet was held for the delegates to the Congress on Wednesday night, August 22, at the "Gürzenich," the magnificent banquet hall of the City of Cologne which was erected in the Fourteenth century and has been completely modernized without losing the beauty of the architecture of the middle ages. Professor Knipping, Vice President of the Congress, presided and introduced the distinguished guests. Music was provided for dancing at the banquet.

Dr. Moersch Receives Decoration from German Government

Vice-Chancellor Blücher presented Dr. Herman J. Moersch, President of the College, with the Great Cross of Merit of the West German Government. The awarding of this medal, the highest decoration which the German Government can bestow upon a physician, was received by Dr. Moersch with profound gratitude. This was a great honor to Dr. Moersch, as well as to the American College of Chest Physicians.

Dr. Myers Receives Varrier-Jones Medal

Dr. Richard R. Trail, London, Regent of the College for Great Britain, was introduced and addressed the assembly:

"Professor Myers, it is my particular pleasure to present to you the Varrier-Jones Memorial Medal, which commemorates the Founder of Papworth Village Settlement. I know of no more worthy recipient. Every man, woman and child in the State of Minnesota owes you a debt beyond repayment; every chest physician and epidemiologist throughout the Americas and Western Europe has sat at your feet with admiration and profit for the past thirty years; I myself have learned from your work both the proper organization and the true aim of prevention in the field of tuberculosis. In accepting this medal you do honor both to Papworth Village Settlement and to the memory of its Founder."

Dr. J. Arthur Myers, Minneapolis, Minnesota, Past President of the American College of Chest Physicians and Editor-in-Chief of the College Journal, *Diseases of the Chest*, received the medal from Dr. Trail and responded:

"Dr. Trail, it is with deep humility that I accept this honor, the Varrier-Jones medal for 1956. I accept it not for myself alone, but also for all of those fine persons engaged in every phase of the tuberculosis eradication movement with whom I have worked during the past 36 years. We have been aided by many persons located remotely in the United States from our center of activity and by many others from numerous nations and territories of the world, a considerable number of whom are in this banquet hall tonight. With each of these persons everywhere I share this honor.

"When Sir Pendrill Varrier-Jones conceived the idea of a colony for the tuberculous 41 years ago and the Papworth Village Settlement was a reality only three years later, I doubt that in his fondest dreams he envisioned what this institution and the movement in general would accomplish in world-wide tuberculosis control in so short a time. The work of this institution represents a strong offensive attack on the tubercle bacillus, and the number of these organisms in the world today is far smaller because of it. Instead of allowing persons discharged from sanatoriums to relapse and again spread tubercle bacilli in their environments, as many as possible were admitted to Papworth Village Settlement where they could continue the conditions of sanatorium life into their return to occupation and home. Also, the thought that the proper place for the patient was with his family, which was arranged in the village settlement, must have been shocking to colleagues of this great man of vision. Those who did not have such a vision must have thought that the village would become a hotbed of tuberculosis in which all the children already in the families and those born after settlement would certainly die from tuberculosis. This did not happen. In fact, the children did not develop clinical tuberculosis. Then came the thought that these children, having lived such sheltered lives, would certainly succumb to tuberculosis when they left the village to enter normal work and city life. This did not occur.

"Papworth Village Settlement is probably the finest example in history of meticulous management of persons having suffered from clinical tuberculosis so their tubercle bacilli were kept corralled in their own bodies, and thus the organisms were denied the opportunity of reaching and perpetuating themselves in the bodies of other people. Moreover, these families, by actual participation in control methods in the village had the principles of control so inculcated that upon leaving the institution they continued to practice them with profit and became missionaries in their communities.

"With improvement in treatment, including antituberculosis drugs, resectional surgery, etc., there was less need for long residence in the village, so effort was directed to vocational training and rehabilitation in general, thus serving more patients.

"The circle of influence of this institution ever widened until now, every place in the world where good tuberculosis work is done the principles learned at Papworth are helping to reduce the numbers of tubercle bacilli.

"If Sir Pendrill Varrier-Jones could now return to Papworth Village and see that you, Dr. Trail, have adopted every new, worthwhile measure and thought, making changes as situations have warranted, ever maintaining the institution in a high state of excellency, I am sure that he would say that no one in the world could have succeeded him so well.

"It is my sincere hope that you will continue your excellent lectures in the various nations where you are so much in demand and that you will continue to publish your classical papers in various journals and magazines, to be read around the world. The work done at Papworth Village by Sir Pendrill Varrier-Jones and you will always justify a prominent place for your names in the immortal hall of fame."

Dr. Banyai Receives Carlo Forlanini Medal

Professor A. Omodei Zorini, Rome, Regent of the College for Italy, presented the Carlo Forlanini Medal of the Italian Federation Against Tuberculosis to Dr. Andrew L. Banyai, Milwaukee, Wisconsin, Chairman of the Council on International Affairs of the American College of Chest Physicians, for his many contributions in the field of diseases of the chest. The following remarks were made by Dr. Banyai:

"Professor Zorini, Ladies and Gentlemen:

"I am deeply touched and overwhelmed by the exceptional honor bestowed upon me by the *Federazione Italiana Contro La Tuberculosis*.

"I consider it a unique privilege to express my appreciative sentiments, heartfelt thanks and profound gratitude for this great honor.

"It gives me immense joy and gratification, indeed, to realize that this world-famous national organization of Italy has given approbation to my modest endeavors in our common field of scientific interest.

"In the presence of a galaxy of eminent chest specialists from all over the globe whose names are so well known in clinical medicine, medical education, public health and research, I feel very humble, indeed.

"This wonderful occasion makes me feel like having been one of the disciples of the renowned Carlo Forlanini whose epoch-making genius opened a new era in the treatment of tuberculosis.

"As I said in a commemorative Editorial in the January 1948 issue of the *Diseases of the Chest*, Carlo Forlanini was the prototype of a great clinician, dedicated research worker and genuine scientist. We should look upon his inquisitive mind and indefatigable spirit as ultimate ideals for all of us to emulate so as to assure progress in quest of better means and ways for the welfare of the sick.

"In due modesty and with utmost reverence I take this opportunity to pay homage and tribute to the memory of Carlo Forlanini.

"At the same time, I want to say in all sincerity that receiving the Carlo Forlanini medal of the *Federazione Italiana Contro La Tuberculosis* is the most memorable event in my professional career. I can assure you I will cherish it with pride and gratitude in all my days."

Social and Cultural Events

Cologne is a great art center and its museums presented special exhibits of medicine in art for the delegates of the Congress. In addition, the City of Cologne sponsored a concert at the Messehalle on Monday evening, August 20, at which the famous Gürzenich Orchestra, conducted by Professor Günter Wand, presented "The Firebird" by Stravinsky and the "Carmina Burana" by Orff. On Tuesday evening, August 21, an organ recital was given at the magnificent Cologne Cathedral. The recital, played by Prof. Zimmermann, included a number of well-known organ selections of France and Germany. Msgr. Hoster, Prelate of the Cathedral, related the history of "The Dom," which is one of the most beautiful Gothic cathedrals in the world.

Visits were also planned for the delegates to the "Bayer" plant, where the world famous Eau de Cologne is manufactured, and to the coal mines and other industrial plants in and around the city. On Thursday, August 23, the closing day of the Congress, the delegates were given a trip on a Rhine River steamer. A number of private dinners and receptions were held during the Congress.

Professor Paul Huebschmann Receives Award



Wiesemann

Professor Paul Heubschmann of Cologne, Germany was awarded a medal by the Italian Federation Against Tuberculosis, at the Fourth International Congress on Diseases of the Chest. The presentation was made by Professor Vincenzo Monaldi, Director of the Tuberculosis Hospital of the University of Naples and Vice President of the Italian Federation Against Tuberculosis. The medal was awarded Professor Huebschmann in recognition of his outstanding work in the pathology of tuberculosis.

Registration

The registration for the Congress reached a total of 2163 physicians and their families, representing 58 countries and territories throughout the world. The following tabulation presents the countries and number of persons represented from each country:

Argentina	11	India	7
Arabian Gulf	2	Iraq	2
Australia	2	Iran	6
Austria	34	Ireland	5
Belgium	57	Israel	2
British East Africa.....	1	Italy	105
Brazil	12	Japan	13
Canada	18	Lebanon	6
Ceylon	3	Mexico	9
Chile	4	Morocco	2
China	1	Netherlands	52
Colombia	4	Norway	6
Costa Rica	2	Panama	1
Cuba	6	Paraguay	1
Czechoslovakia	2	Peru	4
Denmark	2	Philippine Islands	10
Dominican Republic	2	Poland	7
East Pakistan	3	Portugal	44
Ecuador	2	South Africa	3
Egypt	8	Spain	182
El Salvador	2	Sweden	27
England	35	Switzerland	32
Finland	16	Tunisia	2
France	90	Turkey	29
Germany	870	Uruguay	2
Greece	25	U.S.A.	370
Honduras	1	USSR	3
Hong Kong	1	Venezuela	6
Hungary	3	Yugoslavia	8

58 Countries—Total Registration 2163

Acknowledgments

The Board of Regents of the College wishes to express its sincere appreciation to the following persons for their splendid assistance in making the Congress a success:

Dr. Hans Ludes, Director of Arrangements for the Scientific Program
 Dr. Alfred Siebolds, Director of Commercial Exhibits and Motion Picture Programs
 Drs. Bolt, Valentin and Holman, Publicity
 Mrs. Anna Maria Maluquer, Chief Secretary of the Congress Secretariat
 Drs. Endler, Venrath and all other members of Professor Knipping's clinic
 Drs. M. Heydrich, H. Kenter, H. May and G. Ladstetter, Art Exhibitions

A special vote of appreciation is extended by the Board of Regents to Mr. Peter Paul Ortmann, Mr. Franz Heydthausen and Mr. Hans Fassbender of the City Administration of Cologne.



Chancellor Konrad Adenauer receiving testimonial plaque from College officials during interview in Baden Baden on August 27. Left to right: Chancellor Adenauer; Dr. Herman J. Moersch, Rochester, Minnesota, President; Dr. Otto L. Bettag, Chicago, Illinois, Regent; Mr. Murray Kornfeld, Chicago, Illinois, Executive Director, American College of Chest Physicians; and Dr. Ernst Schlapper, Mayor, City of Baden Baden.

Congress Tour

A group of approximately one hundred physicians and their families participated in the Congress Tour which left Cologne on Friday, August 24. The group departed by train to Koblenz, where a new and comfortable Rhine steamer was boarded in time for lunch. The afternoon was spent sailing up the beautiful Rhine, past castles, vineyards and picturesque villages, in the midst of the interesting river traffic of this great shipping artery. Just before 6:00 p.m. the steamer arrived at Wiesbaden where the group was met at the dock by the United States Air Force Band. General Harry G. Armstrong, Commander of the U. S. Air Force Medical Corps in Europe, former Surgeon General of the U. S. Air Force and Honorary Fellow of the American College of Chest Physicians, and members of his staff were on hand to greet the doctors and their families. Professor Hans Wurm, Governor of the College for Wiesbaden, was also at the dock when the steamer arrived. The band played many of the well-known marches and songs of America which were deeply appreciated by those on the tour.

The following morning, Saturday, August 25, a scientific program was presented at the New Museum in Wiesbaden, which had been arranged by Professor Wurm and the medical association of Wiesbaden, with the cooperation of the U. S. Air Force Medical Department. The program was as follows:

"Diagnosis and Treatment of Cough"

Andrew L. Banyai, Milwaukee, Wisconsin, USA

"Primary Tuberculosis in Children"

Kornel L. Terplan, Buffalo, New York, USA

"Staphylococcal Pneumatocele in Infants and Children"

F. E. Stull, D. C. McGoon and J. W. George, U. S. Air Force Medical Corps

"Progressive Fibrosis of the Lung"

Hans Wurm, Wiesbaden, Germany

There was simultaneous translation of the papers into German and English arranged by Colonel William H. Westbrook of the U. S. Air Force Medical Corps. The meeting was well attended by German physicians as well as members of the U. S. Air Force.

Dr. Jur. Mix, Mayor of the City of Wiesbaden, gave a lovely reception and dinner for the Congress Tour group at the Kurhaus of Wiesbaden, which was followed by a visit to the Casino. In response to the address of welcome delivered to the group by the assistant to the Mayor, Dr. Moersch, President of the College, spoke as follows:

"On behalf of the American College of Chest Physicians, I wish to thank the community of Wiesbaden for the splendid welcome that has been extended to us. It is a great pleasure to visit your beautiful city. The Fourth International Congress on Diseases of the Chest indeed proved a most fruitful occasion. It was attended by physicians from nations all over the world and has afforded a marvelous opportunity for the exchange of ideas and information which should prove of benefit to all mankind. Such a meeting as the one just concluded must, I am sure, lead to a better understanding among peoples and eventually to a greater peace, which is essential to a full and happy life."

On Sunday morning, August 26, the group left Wiesbaden by chartered buses for the trip to Frankfurt, Heidelberg and an overnight stay in Mannheim. In Frankfurt the group visited the home of Goethe and the beautiful botanical gardens. After an interesting tour of the city, they stopped for lunch at the Kaiserhof in Frankfurt, and a visit to the famous Heidelberg Castle was made in the afternoon.

The group arrived in the lovely resort city of Baden Baden at midday on Monday, August 27. Dr. Ernst Schlapper, the Mayor of the City, received the physicians and their families at a reception that evening in the Kurhaus of Baden Baden. A dinner followed the reception, accompanied by music and entertainment. Dr. Schlapper delivered a welcoming speech to which Dr. Moersch responded in the same vein as he did at the reception in Wiesbaden. The evening was concluded with a visit to the Casino of Baden Baden, reputed to be the most beautiful in Europe.



Prof. A. Omidei Zorini, Rome, Italy, recipient of the International College Medal, receiving the congratulations of his friends and associates at the Inaugural Ceremony of the Congress.

During the visit to Baden Baden, Chancellor Konrad Adenauer, who was staying at Bühlerhöhe, received a delegation of the American College of Chest Physicians. The delegation comprised Dr. Herman J. Moersch, President, Dr. Otto L. Bettag, Regent and special representative of Governor Stratton of Illinois, and Mr. Murray Kornfeld, Executive Director of the College. Dr. Moersch presented the Chancellor with a specially prepared plaque in recognition and appreciation of his distinguished contribution to the Fourth International Congress on Diseases of the Chest. Dr. Bettag presented Chancellor Adenauer with an engraving of Abraham Lincoln autographed by Governor William G. Stratton of the State of Illinois, which the Governor had sent as a remembrance of the Chancellor's visit to Illinois recently. Mr. Kornfeld presented Chancellor Adenauer with a special certificate prepared by the Executive Committee of Germany in appreciation of his support of the Congress. The presentation ceremony was broadcast over the German radio network and the response which Chancellor Adenauer gave was as follows:

"It is a pleasure and a great honor for me to welcome the officials of the American College of Chest Physicians who have attended the Congress in Cologne. I was kept informed about the Congress through my son and through the press. The news which I received about the Congress was excellent, and I know that you had a most successful Congress in Cologne.

"The exchange of scientific information is most beneficial to all peoples throughout the world. I welcome such a Congress to Germany, not only as a humanitarian undertaking, but one where the goodwill of peoples throughout the world is enhanced. In my estimation, scientists do not compete for any other reason except for the well-being of all peoples, and they contribute greatly to the unification of our world.

"I wish to express my thanks to your President for the fine expression of goodwill and his interest in the success of the Congress. I also wish to thank the Governor of the great State of Illinois and the Mayor of Chicago, for their nice letters. The portrait of your famous President, Abraham Lincoln, will be placed in my library, and I am deeply appreciative of the Certificate awarded to me by the American College of Chest Physicians.

"Gentlemen, I now invite you to join me for a cup of tea and for a friendly visit."

On Tuesday afternoon, August 28, the group traveled by train to Munich, arriving there early in the evening. The following day was spent touring this interesting capital city of Bavaria and in the evening a party was given for the group at the Platzl Restaurant by Dr. Thomas Wimmer, the Mayor of Munich. The entertainment consisted of typical songs and dances of the region.

Thus ended a most interesting trip through the colorful German countryside. The College is most grateful to the Mayors of the various cities who entertained the physicians and their families so lavishly.

Congress on Bronchoesophagology

Many of the physicians who attended the Congress in Cologne, traveled to Vienna to participate in the Fifth International Congress of Bronchoesophagology held in that city, August 31 through September 2. An interesting scientific program was presented at this Congress. Dr. Chevalier L. Jackson, Philadelphia, Pennsylvania, USA, is Executive Secretary of the International Bronchoesophagological Society.

Dr. Adenauer Congratulates College

The following letter was recently received by the Executive Director of the College from Dr. Max Adenauer, Director of the City of Cologne:

"Thank you very much for your kind letter of September 20. The appreciation which you expressed to the officials of the City of Cologne for the success of the Congress actually belongs to you and the American College of Chest Physicians.

"The Congress was beautifully organized and I know that it would be difficult to improve upon it. I personally want to thank the College for selecting the City of Cologne as the site of the Fourth International Congress on Diseases of the Chest, and I would be very happy if your future trips would not only bring you into the vicinity of Cologne, but right back to our City.

"My wife and I send our very best wishes to Mrs. Kornfeld and you.

Dr. Max Adenauer"

College Chapter News

ILLINOIS CHAPTER

The Illinois Chapter will meet on Tuesday evening, December 18 at the Children's Memorial Hospital, Chicago. This regular monthly meeting will be held jointly with the Chicago Pediatric Society.

NEW ENGLAND STATES CHAPTER

The next regular monthly meeting of the New England States Chapter will be held at the Joslin Auditorium, New England Deaconess Hospital, Boston, on December 19. Dr. Bernard L. Brofman, Cleveland, Ohio, will speak on "Results of Surgical Management of Coronary Heart Disease." At the chapter's October meeting, Dr. Thomas K. Burnap of Boston spoke on "The Role of Assisted Ventilation in the Treatment of Chronic Pulmonary Disease" and Dr. Maurice Sones of Philadelphia spoke on "The Course of Sarcoidosis" at the November meeting.

PHILIPPINE CHAPTER

The Philippine Chapter, in conjunction with the Philippine College of Surgeons, held a scientific session at the Quezon Institute, October 30. After opening remarks by Dr. Miguel Canizares, Regent of the College for the Philippines, and Dr. Jose Y. Flores, President of the Philippine College of Surgeons and a Fellow of the College, the following program, consisting of panel discussions, was presented:

"Diagnostic Problems in Cancer of the Lungs"

Fortunato S. Guerrero, Angel I. Reyes, Enrique M. Garcia

"When to Refer Cases of Pulmonary Tuberculosis to the Chest Surgeon"

Laureano Bautista, President, Philippine Chapter, A.C.C.P., and Enrique M. Garcia

Discussors: Fidel Nupomuceno, Benito C. Garcia, Alfredo Balderrama, Marcelino F. de Guzman, and Cristino Lazatin

KENTUCKY CHAPTER

At the annual meeting of the Kentucky Chapter held in Louisville, September 18, members elected the following new officers:

President: Earl Rudolph Gernert, Louisville

Vice President: Daniel N. Pickar, Louisville

Secretary-Treasurer: J. Ray Bryant, Louisville (re-elected)

VIRGINIA CHAPTER

The Virginia Chapter held its annual meeting in Roanoke, October 14. The following chapter officers were elected:

President: Thomas N. Hunnicutt, Jr., Newport News

Vice President: Edward S. Ray, Richman

Secretary-Treasurer: Samuel McDaniel, Norfolk

NEWS NOTES

Dr. William R. Barclay, Chicago, has been appointed Associate Professor of Medicine at the University of Chicago.

Drs. Angel Luis Morales and Victor Narvaez Obeso of Lima, Peru, have been elected President and Vice President respectively of the Sociedad Peruana de Tisiologia.

Dr. Leonard A. Scheele, Honorary Fellow of the College, has recently assumed the presidency of Warner-Chilcott Laboratories, Inc. of Morris Plains, New Jersey. Dr. Scheele resigned as the Surgeon General of the United States Public Health Service.

Dr. Otto L. Bettag, Chicago, Director of the Illinois Department of Public Welfare, was recently elected a member of the Joint Commission on Mental Illness and Health.

Dr. Hawley H. Sellar, Tampa, Florida, served as guest moderator at a recent District One Tuberculosis Sanatorium Chest Conference in Decatur, Alabama. Dr. Sellar also discussed surgical diseases of the esophagus and presented an exhibit dealing with variable forms of bronchogenic carcinoma.



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Assistant medical director wanted for Mineral Springs Sanatorium, Cannon Falls, Minnesota, a 100-bed county tuberculosis hospital with active medical, surgical, out-patient, and investigative programs. Salary determined by experience. Furnished house and utilities supplied. Applicant must be male graduate of approved U. S. or Canadian medical school and eligible for Minnesota license. Address: E. V. Bridge, M.D., Superintendent.

Full time staff physician wanted for the Idaho State Tuberculosis Hospital, Gooding, Idaho. New, fully modern hospital building nearing completion to replace several small, antiquated units, bringing the total bed capacity to 100-120 beds. Salary governed by training and experience. Apply: Medical Director, Idaho State Tuberculosis Hospital, Gooding, Idaho.

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CALENDAR OF EVENTS

NATIONAL MEETING

23rd Annual Meeting, American College of Chest Physicians
Hotel Commodore, New York City, May 29-June 2, 1956

POSTGRADUATE COURSES

Postgraduate Course on Diseases of the Chest
Nashville, Tennessee, January 14-18, 1957

Postgraduate Course on Diseases of the Chest
San Francisco, California, February 25-March 1, 1957

3rd Postgraduate Course on Diseases of the Chest
Jersey City, New Jersey, March 6, 13, 20, 27, 1957

CHAPTER MEETINGS

Illinois Chapter, Chicago, December 18, 1956

New England States Chapter, Boston, December 19, 1956

Clinical Session, New York State Chapter,
New York City, February 22-23, 1957

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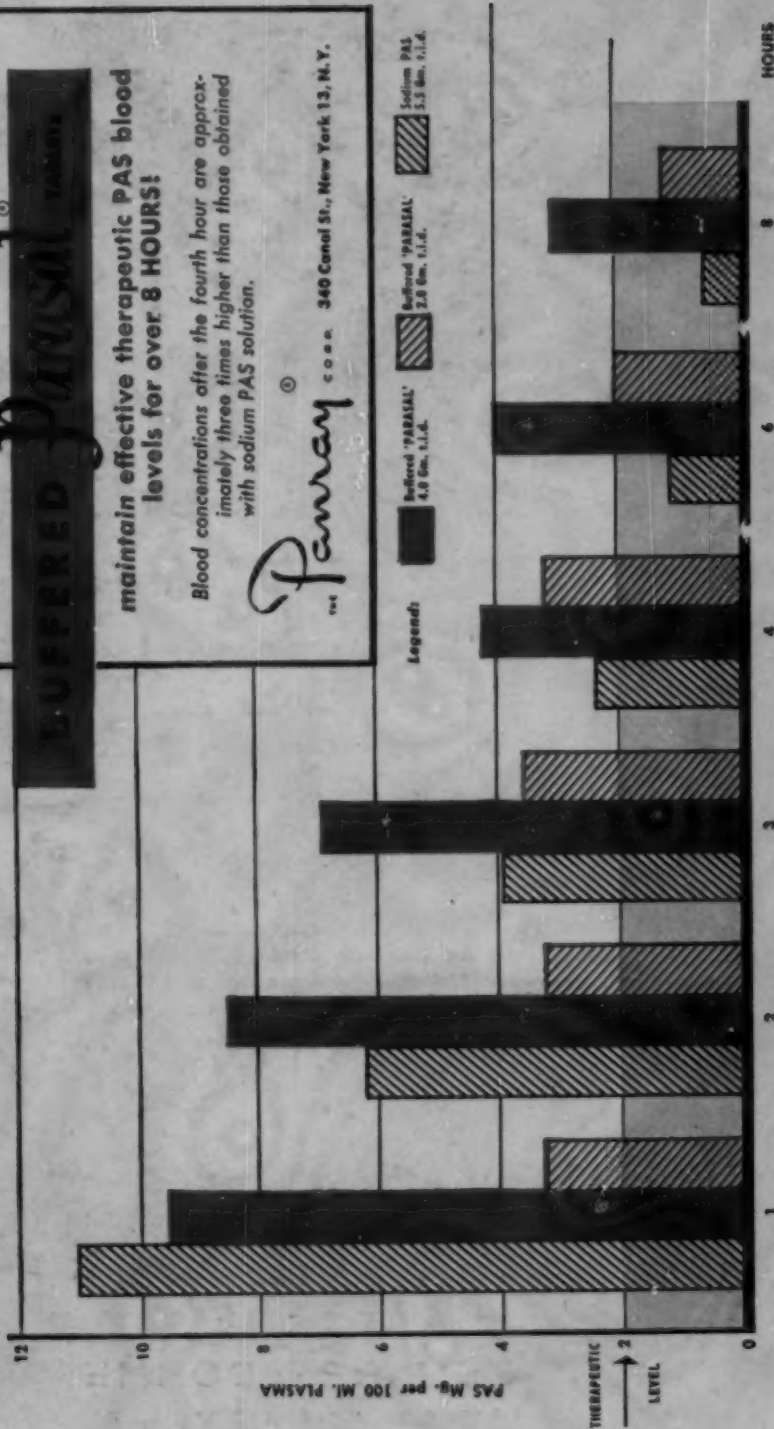
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Ref.: Deeb, E. N. & Vitagliano, G.R.: A. Rev. Tuberc. & Pul. Dis.: 72,543-7 (Oct. '55)

*Based on multiple dosages, levels determined after 2nd dose of day.